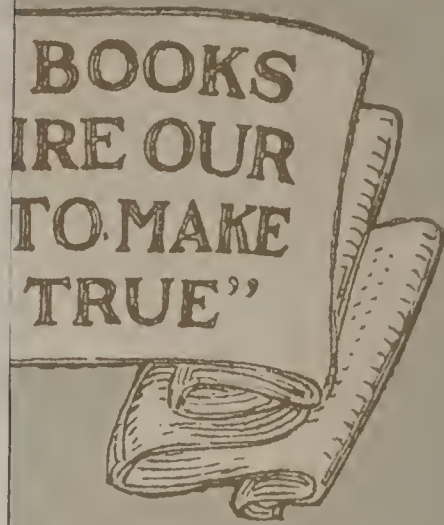
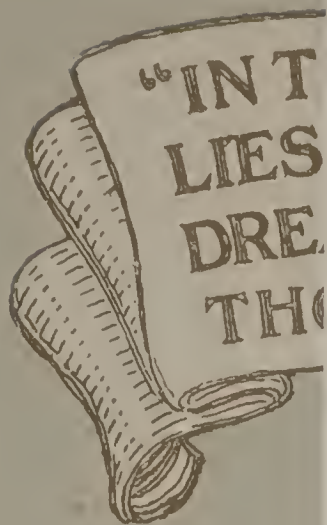


PICTURED KNOWLEDGE





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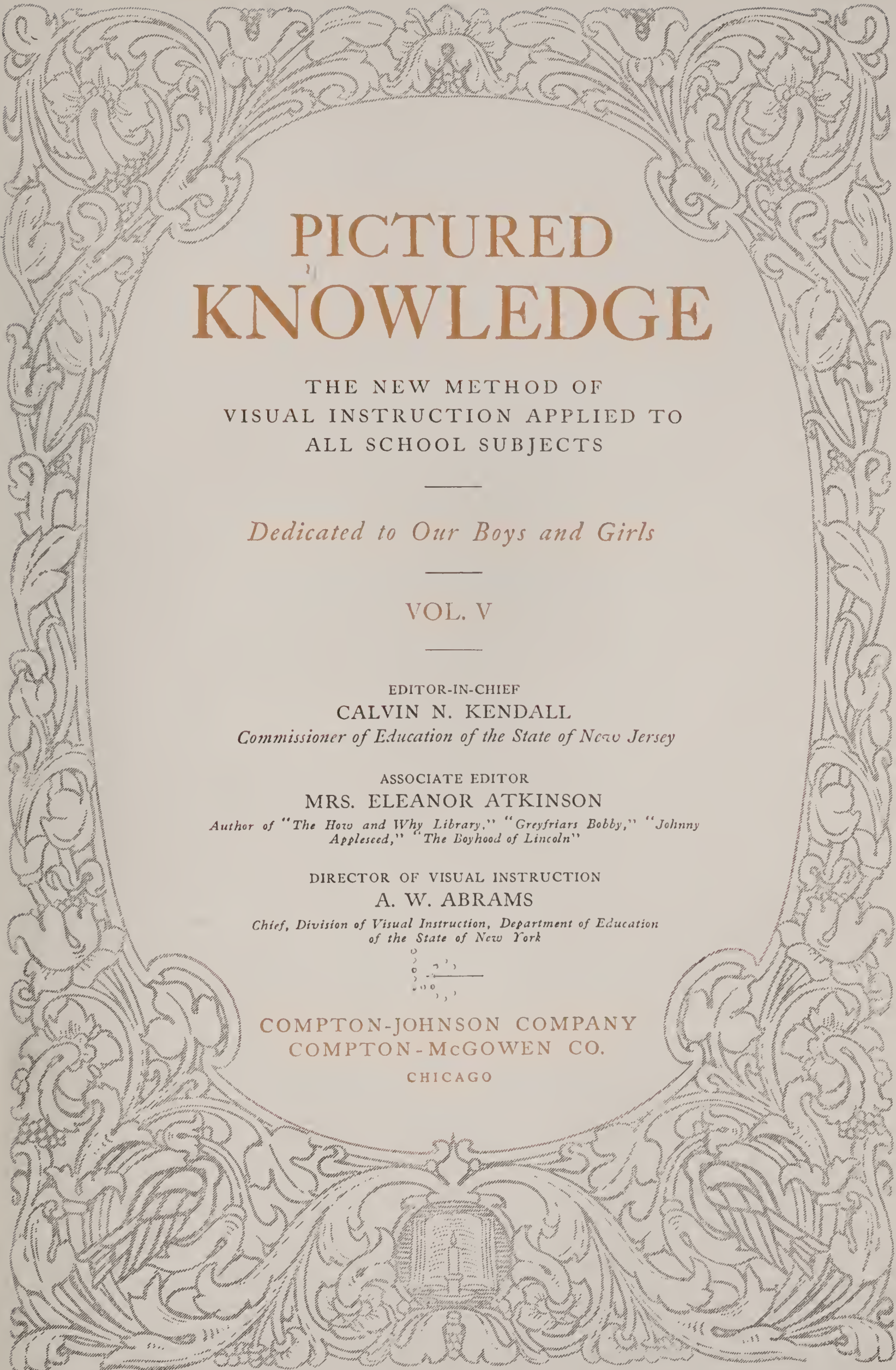
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PICTURED KNOWLEDGE

THE NEW METHOD OF
VISUAL INSTRUCTION APPLIED TO
ALL SCHOOL SUBJECTS

Dedicated to Our Boys and Girls

VOL. V

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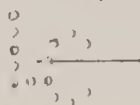
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no 1



Wonderful Pictured Knowledge People of Long Ago



THIS is a scene on Lesbos, one of the islands in the blue Aegean Sea, before the days of books. Sappho, the beautiful Greek poetess, who wrote such wonderful verses that she was known as the Tenth Muse, lived on the island of Lesbos, where she was the head of a school of women poets. Tired of singing and dancing to the accompaniment of the lyre and the tambourine, Sappho and her friends have all collected on these marble benches overlooking the blue sea, and a young Greek is reading passages from Homer with the poem spread out before him on a scroll. The scrolls were the only kind of "books" the Greeks had, and they had very few of these. But they had extraordinary memories. Even boys at school could recite the whole of the Iliad and the Odyssey.

These scrolls were made of the fine bark of the Egyptian papyrus. The strips were glued together in one long sheet, which the reader gradually unrolled with one hand and rolled up with the other as he read.

The Greeks were the most brilliant people who ever lived. Everybody knows their sculpture. But they were equally great in poetry, science, philos-

ophy, oratory—in almost everything that makes life beautiful and interesting. No people ever produced so large a portion of great men out of so small a population. Just think of it—Athens, the most brilliant of all the Greek cities, had only about 30,000 citizens.

And do you know why the Greeks did all these things? Because among other things they were, more than any other nation in history, what we may call "pictured knowledge" people. They not only reproduced and created beautiful forms in their statues, their temples, their vases, but they thought in pictures, talked in pictures, wrote in pictures. Almost every word in their language was a picture and carried its meaning on its face. The Greek word for cow, for instance, meant "foot dragger." Did you ever notice the peculiar way in which a cow drags her feet in walking? Not only was it easy for Greek children to remember such picture words, but the use of such words made them very observing. You know how hard it is to remember the meaning of new words, and how easy it is to remember a picture. So, because their language taught to the little Greeks to observe

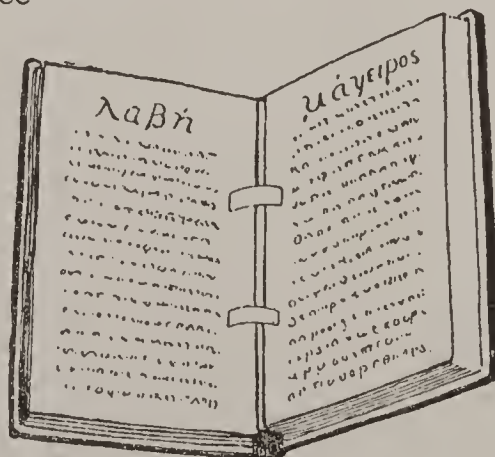
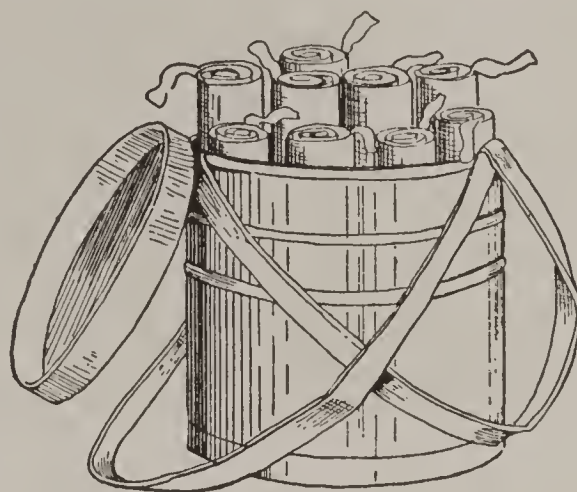
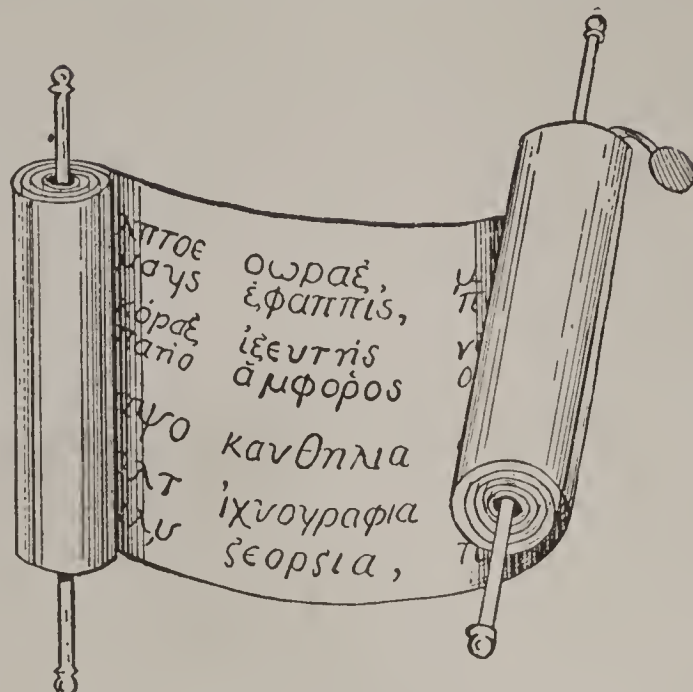
whether a cow does drag her feet, for example; and the things learned in Greek words were so easy to remember, they then learned very fast. Do you know why you can dream such long dreams in such a short time — dreams that would make five reels of a movie show, but really only last a few moments when you are dreaming? It is because a dream is a succession of pictures of whatever you are dreaming about.

Because of this habit of seeing everything very clearly, the Greeks were like eager, curious children — grown up people and all — and they learned about the world and its wonders and its mysteries, and told about them and what they thought about them in sculpture, temples, philosophy and oratory, in poetry and song.

The Riddle of the Reed

Just to show you what children even the grown-up Greeks were — how do you suppose they amused themselves, say at an evening party? By asking riddles, for one thing. Here is a Greek riddle: "I was a reed, a useless plant at first; for from me grew neither apples nor figs, nor the clustered grape. But a man gave me thin lips, and made me the channel for a narrow stream. From that time, when I drink black ink, I, like one inspired, speak winged words with a voiceless mouth."

Can you guess it? There is a drawing of it right under your eye. It is the reed pen. But isn't the word-picture in the riddle just as perfect as the picture in the drawing? Every little thing is put into the word-picture — the reed, its long narrow channel full of ink, the thin lips, and how it drinks when you dip it. But this Greek riddle-maker was not content with making a picture of the pen alone. He adds the picture of a man speaking and of words flying through the air with wings, and the shape of the



grape (clustered). Words like these are really pictures. Can't you see them?

Why the Greeks Did Not Like Learning Their A B C's

The Greeks thought it so much more important to tell things in pictures than in mere printed words, that for centuries they did not use the letters of their alphabet for writing stories or poems at all. They only used them for recording contracts and other business transactions. They said the written word did not look like the thing it stood for, and when they finally did begin writing their wonderful books, you see they still used these words to make pictures.

Why Pictures Should Be Taught to Talk

The Greeks not only had the fondness of children for pictures, but they were like children in another respect. They did love to talk. That is why the great Greek philosopher, Plato, said you learn so much more by having people tell you about things and answer your questions than if you merely read about these things, or even looked at pictures of them. "The people in paintings," said he, "look as if they were alive, but you ask them a question and they preserve a solemn silence." So you see why in Pictured Knowledge we have made the pictures talk.

The Pictures on This Page

The pictures on this page are interesting chapters in the history of books. At the top is a Greek scroll, with a little label on a slip hanging out of it to show when the scroll was all rolled up what it was about. The next picture shows a case for carrying these scrolls. Next is a reed pen and an ink stand, and below is a book made of separate leaves. It looks much like the books we have today, doesn't it?

How Pictured Knowledge Learned to Talk



The Scribes

It was another long time after books with "lids" were invented before men stopped making them with the pen—just as you make those delightful illustrated books of your own about geography, history, and things in school. The most beautiful work of this kind was done in the monasteries. You see one of the monks with a folio volume on which he is working like an artist at his easel. He is sitting where he can get a good light. He is, no doubt, designing and coloring an illuminated letter at the beginning of a chapter in the book. As early as the Thirteenth century, in spite of this slow way of making books, there was quite a book trade. No university or monastery was complete without its staff of scribes who wrote the main body of the work, and illuminators who put in decorations in the initials and on the borders of the page. No book was popular unless it was ornamented and illuminated in this way.

WELL, I thought I never
would get here!

Who am I?

This book you are reading. I am just full of stories of other things; I tell other people's stories, so isn't it fair to let me tell my own story? Such exciting adventures as I had with men and machines. To get the paper I was printed on—now what is that wasp doing in here? It isn't *his* story.

"Buzz-zip! Speaking of paper," says the wasp, "I thought

I would tell you that I was the first paper-maker in the world. Human people think themselves very bright. But really they are slow about some things. Ages before men made paper we wasps used bits of wood, chewed them to a pulp, and then spread the pulps out thin to dry. We have always made our little gray nests that way. Good-by."

Where the Old Rags Go

Mr. Wasp is right. But to make paper, you could print on, or write

In the Library



The books of the Middle Ages were mostly on law or religion. Here we see a high dignitary of the church sitting in his chair while his assistants are looking up authorities for him and they are talking matters over. You see they still had important manuscript in the shape of rolls, although new works were bound in covers. On the right you see a large volume resting on a stand similar to those on which our big books, like dictionaries, are sometimes kept today.

on, we would have to bleach the nest of an ordinary wasp and iron it smooth. There is a wasp that makes a nest so smooth and white you can write on it. Fine book papers, such as I am printed on, are made of rags and wood pulp mixed. Whole spruce trees, with the bark stripped off, are ground to a mush in a machine and mixed with pulp of cotton rags. The pulp is boiled with lime and soda to clean it. Then it is bleached with acids, and thinned with water until it looks like milk—but thinner.

Then this milk flows out of a tank onto a wide copper wire screen belt. On the belt it drains and is shaken gently together until it becomes a thin wet sheet, like a wet sheet of blotting paper. As it leaves the belt it passes between rollers that look

like big clothes-wringers. But these rollers are hot. They dry the pulp, iron it smooth, trim and wind it—miles of it. Paper for newspapers is wound on big iron spools ready to be fed into the newspaper printing presses. But the kind of paper you are looking at is cut into large sheets and packed in bales. The smooth paper on which my colored pictures are printed—remember who is talking—was starched with glue and white clay. Then it was steamed, ironed and polished until it was as glossy as father's collars, when they come home from the steam laundry.

How the Printer Says His A B C's

Making the type on which I am printed is another story. Has your father a rubber stamp? The rubber

The Press



This is one of the famous pictures you will see on the walls if you ever visit the Congressional Library in Washington. It was painted by an eminent American artist, John Alexander, and is called "The Press." It shows a noble of the Middle Ages examining with great interest, a sheet which has just been printed on the screw press, which the man is working on the right. Presses were great novelties in those days, and you can imagine how their work must have interested a man of fine culture like this nobleman.

letters on it were molded. The type in printing offices was cast in molds. The letters on the ends of the bars in a typewriter were cast, too. When father was a little boy all types were cast by pouring melted type-metal into molds. Type was kept in the printer's "case," each letter in a different nest. The printer picked up one type at a time, and set it in a box, or "stick," to spell words. That was slow work. It was the typewriter that hinted at a new way of setting type. When the key of a typewriter is struck, a bar flies up, hits the paper and prints a letter. To print on a typewriter is like playing on a piano.

"Why don't you *make* your type as you need it, Mr. Printer Man?" the typewriter seemed to say.

So men, taking this hint, built typesetting machines of two kinds. One kind is called the monotype machine, the other the linotype machine. When an operator of a mono-

type, or one-type-at-a-time machine, strikes a key, a hole is punched in a long paper ribbon. This ribbon is wound on a spool, something like the music roll of a piano player. In the piano player, as the roll unwinds, a tune is played. So when the monotype roll is put into the casting machine and unwound, words are spelled in hot type-metal.

Inside the machine is a frame filled with little blocks of wood, with letter molds cut in the top. That frame darts around like an excited water bug. Each letter that was struck on the keyboard comes, in turn, under a pot of type metal that is kept melted by a gas jet. A drop of molten metal spurts out and fills the mold. It works in the queerest way. It's like playing a flute! The perforated paper ribbon is made to run over a tube with holes in it, just as you slip your fingers over holes in a flute. The tube is filled with

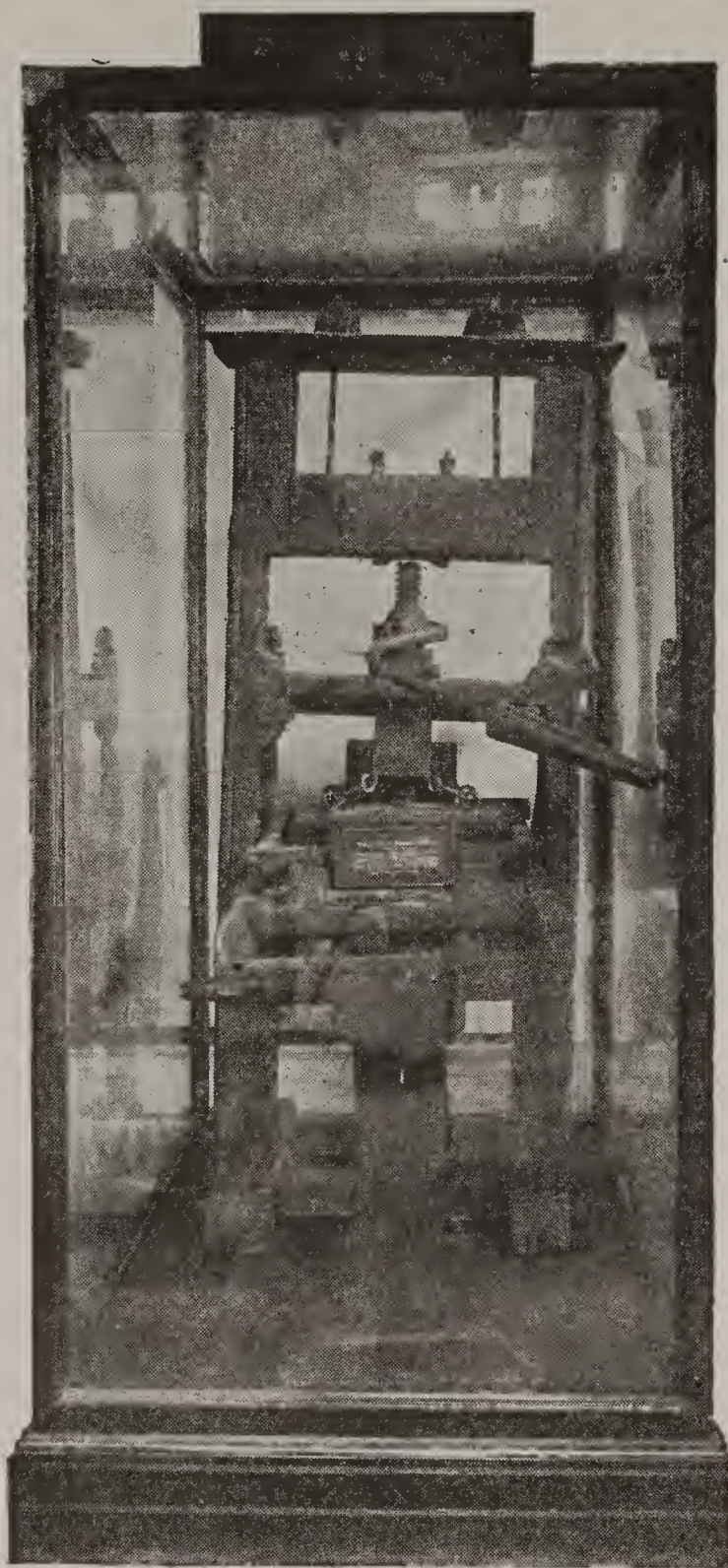
*Spelling
With
Hot Lead*

The Press that Franklin Worked

compressed air. When a hole in the ribbon comes over a hole in the tube, the air is blown through and into a pipe. The pipe is a sort of popgun with a pin plug in it. The pin jumps out and pushes that frame of letter molds about, so the right letter comes up to the melting pot to be filled. You would think the monotype machine had brains.

A "Line-o'-type"

The linotype casts a whole line of words in one solid bar. The type molds, or matrices, are in the edges of flat pieces of brass. The operator of a linotype plays on a keyboard, too. Watch him make that machine spell something for you. When he strikes a key a brass letter mold rushes down a narrow alley



While you are in Washington you are sure to want to go through the museum of the great Smithsonian Institution. There you will see what is known as Franklin's printing press, the one he used when he was a journeyman printer in London. It is kept in this glass case because, unless it were protected, visitors—particularly inquiring boys—would be sure to take hold of that handle and give it a turn just to see how it worked. You laid your sheet of paper for printing on the flat bed of type, just as you see it in the small country presses today. Then you turned a crank (not shown here) like the crank of a windlass. This carried the bed with its type on a cog track under a metal plate called the platen. The screw you see in the picture fitted into the center of the platen in a kind of ball and socket joint. Then you gave the handle a turn, and that screwed the platen down firmly on the paper and pressed it against the type. The action in a screw press was like that of a screw when you turn the screw-driver, only the "screw-driver" in the press stood at right angles to the screw. In printing a newspaper on this press you could only print a page at a time.

like a boy on a toboggan slide. "Rat-tat-tat, clickety-click - click!" a crowd of molds slide down, are carried across a belt, and lined up like a row of tin soldiers. Then the machine moves the whole row over to the melting pot. A plunger forces the metal up through a tube like the stem of a tobacco pipe and fills the matrices. In a moment the metal hardens into a line-o'-type. You have to read it backwards, like Hebrew.

"Hello, John! I can beat you at spelling and punctuation," it reads.

Can it? Can it beat you? But just watch the little brass molds go home again. Each one is a latch key to unlock its own door. You know a Yale door key has notches that just fit the lock:

Caxton, the King, and the Printing Press



Imagine a king and his court today visiting a little print shop like this. Nearly every boy wants a little printing press of his own, and sometimes gets his first introduction to the wonders of machinery in the work of the press that prints the newspaper in his town. But even kings could enjoy the wonders of the printing press in the days to which this picture takes us back, for at that time the printing press was a new thing and a wonder-working device. If you wanted to own a book printed on this press, it would cost you more than all the beautiful school books you have had, or will have even if you go clear through the university, for Caxton, who is standing behind the press showing it to the king, was the first English printer. The books that he printed command very high prices, partly because they are very beautifully done, and partly because of their historic interest and their rarity. One of them was sold in London some years ago for over \$10,000.00.

The king, Edward IV, was at this time a handsome man in the prime of life, as you see by the picture. The lady on his right is the queen, Elizabeth Woodville, whom he married secretly, against the

wishes of Warwick, "the kingmaker." Although Edward was king of England, he had very gracious manners toward his people. The three children with King Edward and Queen Elizabeth are Elizabeth, Richard, and Edward. The little girl afterwards became a queen like her mother, as the wife of Henry VII. Look up the story of little Edward the Fifth, and read about these three royal children.

The king, his family, and the court are looking at the freshly printed page which the little printer's boy is holding before them. The little group of men around the table at the left comprise the bindery of this printing establishment. Notice the strings suspended from the horizontal bar; they are for fastening the pages together. On the floor there are glue pots, loose leaves to be bound, and books all ready bound. At the right two men are at work setting type by hand. Near them is a basket that looks like a waste basket. It holds the manuscript that is going to be printed next. The beautiful pillar and arches in the background look rather queer in a printing office, don't they? But this one was set up in one of the rooms of the king's palace at Westminster.

Well, the little brass molds have notches, each one different from the other. And these notches have teeth. With these teeth they cling to a "distributor" bar to be carried up that toboggan slide. Channels and stalls open along the way, and the molds try every one, but they have to go on until each finds its *own* door. They act just like little pigs, these little molds, poking their noses into every hole, until they find one that they fit. Then in they go!

To make a book is like the seven labors of Hercules. When one hard thing is done there is another waiting. In big printing offices, printing is not done from the types, but from copper plates called electro-types.

A type page is laid on an iron table, warmed by steam and brushed over with the same kind of smooth black powder that you get in sharpening a lead pencil. It is called graphite. This is to keep a thin sheet of wax, that is laid on the type, from ticking. Press a penny into a piece of soft gum and make a picture of it.

In the same way a wax impression is made of the type page. Then the wax is lifted carefully, dusted on the face again with the graphite powder and hung in a bath of water, in which copper and sulphuric acid are dissolved.

After it is dissolved, of course, you cannot see the copper at all. You know you can't see the sugar or salt that is melted in water. Now, when the current of electricity is turned into the bath, the copper just flies to the graphite powder on the wax. The copper forms a thin shell with the shape of the type on it, like the shape of the penny in gum. This is called electro-typing. Then the wax is melted out of the shell. The

back of this copper plate is filled with lead to make it solid, and the plate is nailed to a wood block.

The Wasp Who Told Us How to Make Paper From Wood

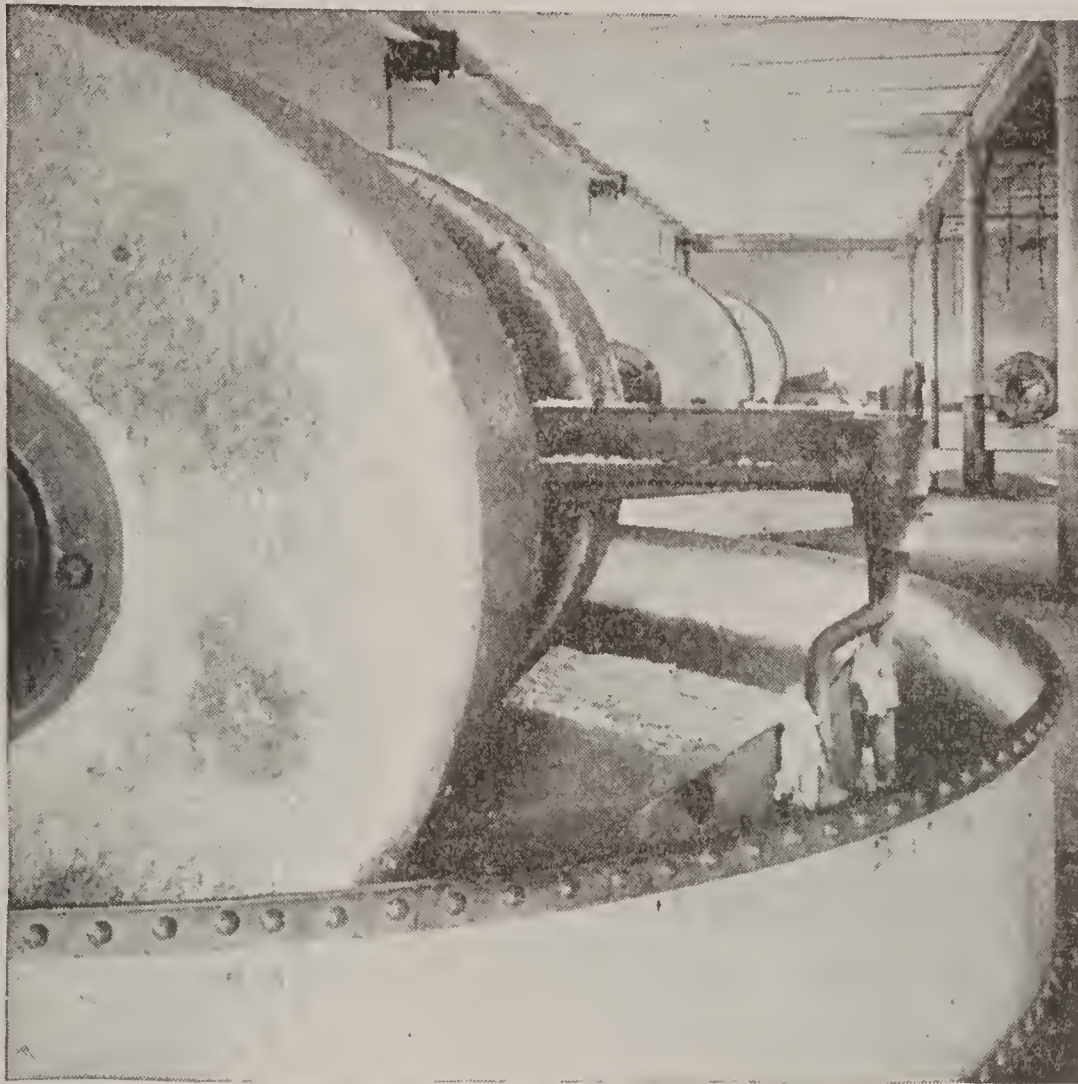


Of course all of us have heard that the wasps were the first paper-makers, but did you know that it was a wasp who told the first paper-makers how to make paper from wood? And it was a particular wasp who did it. She was born in the Harz Mountains in 1839. One day in the fall a German paper-maker named Gottfried Keller, returning from his mill, stepped on an empty nest which this wasp had made and kept house in with her brood during the summer, and which the autumn winds had blown down. He crumpled it in his fingers, and decided it was wood pulp and wondered how the wasp did it. With a friend he experimented, decided that the wasp had made her paper house out of spruce, tried it on a grindstone, using water to mix the pulp, as the lady wasp had used saliva, and so discovered the secret. The thousands upon thousands of newspapers that are turned out from the presses all over the world every day, are all made from wood pulp paper—all because of the hint of this little lady wasp of themountains.

Our picture here shows a very high quality of white paper made by a Brazilian wasp. The surface is so fine and smooth that you could write on it with a fine pen.

How I Had My Pictures Taken

No, I cannot be printed yet. My pictures have to be made. A book without pictures is like an egg without salt. I have three kinds of pictures, each kind printed from plates



Like Gottfried Keller's Old Grindstone

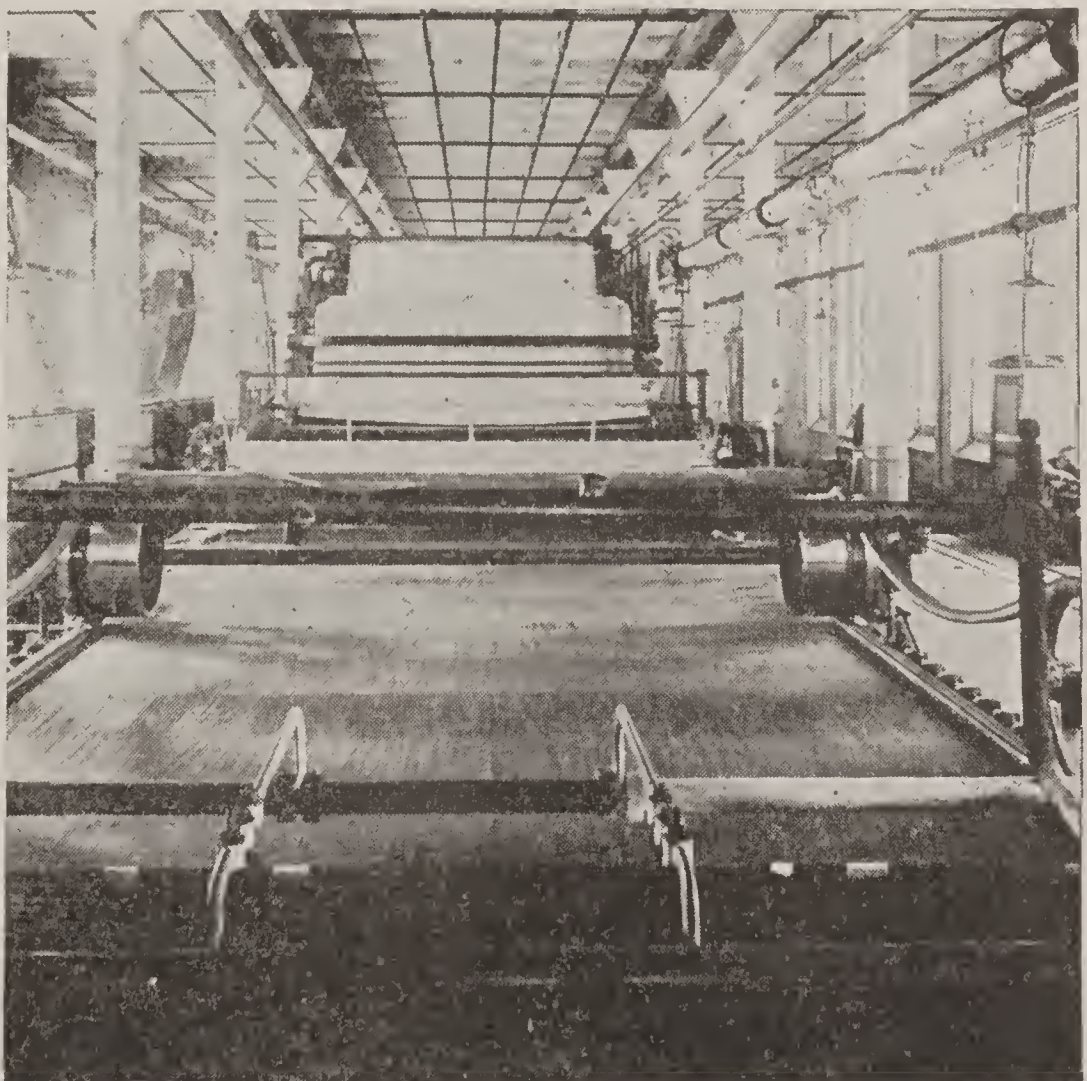
Here you see how the great paper mills have taken the hint from the wasp and Gottfried Keller's old grindstone. The huge grindstones here are called crushers because they crush the pulp after it has come from the grinding machines. This is done so there will be no lumps or strings left in it.

These engravings are reproductions in line or screen effect from drawings, paintings, photographs or objects. If you have a kodak you know that the photographs you make are from exposures, through the

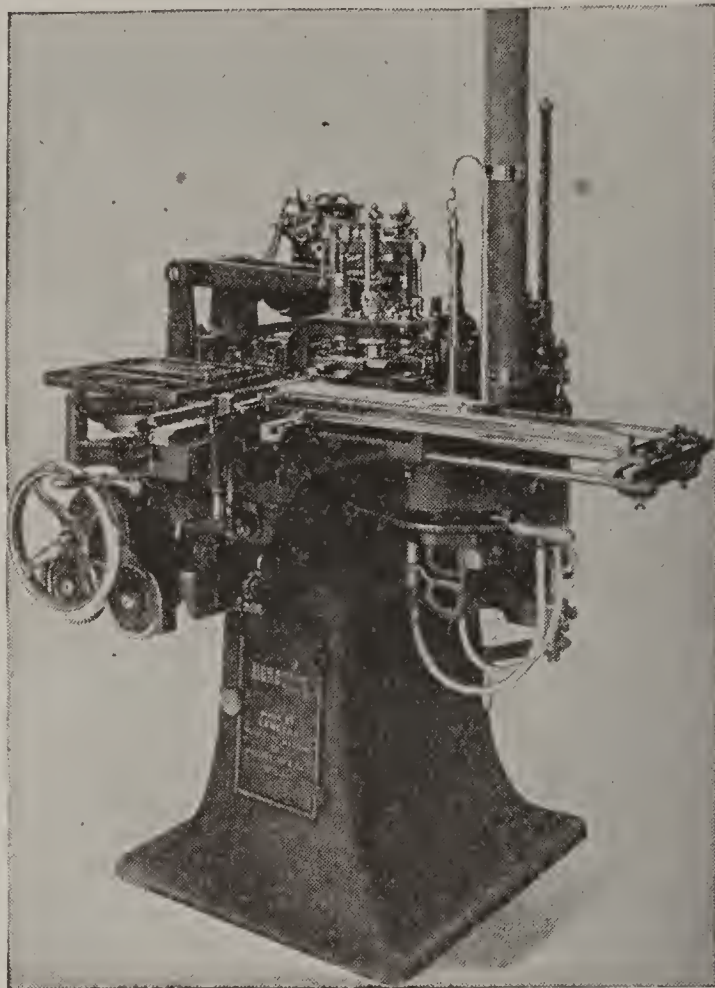
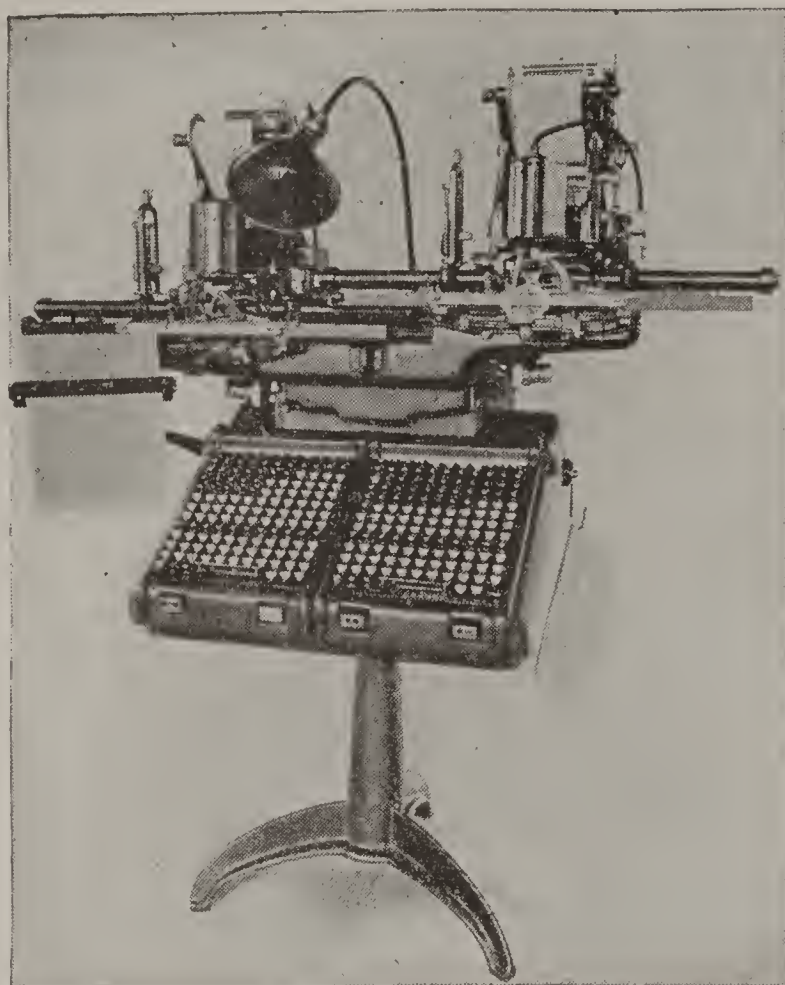
made by the photo-engraving process, and known as zinc etchings or line engravings, black and white or half-tone engravings, and half-tone color engravings.

Where the Pulp Is Changed to Paper

Here is where the pulp is changed to paper. Before you, you see running an endless belt of fine mesh wire cloth on which the pulp is spread out. Those rubber belts on the right and left move with the pulp and keep it in place. As the stream flows along, the water filters through the wire mesh, leaving the fiber on the surface, and the shaking motion of the wire cloth helps to knit the fibers together. In the distance where you see the white paper mounting toward the skylight, the sheet of pulp has passed under a cylinder called the "dandy roll." Then it goes between the first press rolls, then through the second press rolls, then to the drying cylinders, and on through the calenders, or finishing rolls.



The One-Type-at-a-Time Machine



Here are two pictures of the Monotype machine. The one on the left shows you the keyboard on which the operator spells out the words just as the typewriter operator does on her machine. Above, and to the right, you see the paper ribbon in which the holes are punched. When the roll is put into the casting machine (on the right), it causes the machine to cast these letters in metal, and set them up in rows so as to spell the words which the operator has written.

sensitive to the action of light, and when the exposure is made the image is transferred to that film. When the film is developed you have what is known as a negative. From this negative you make prints on sensitized paper. The result is a photograph of the object or scene.

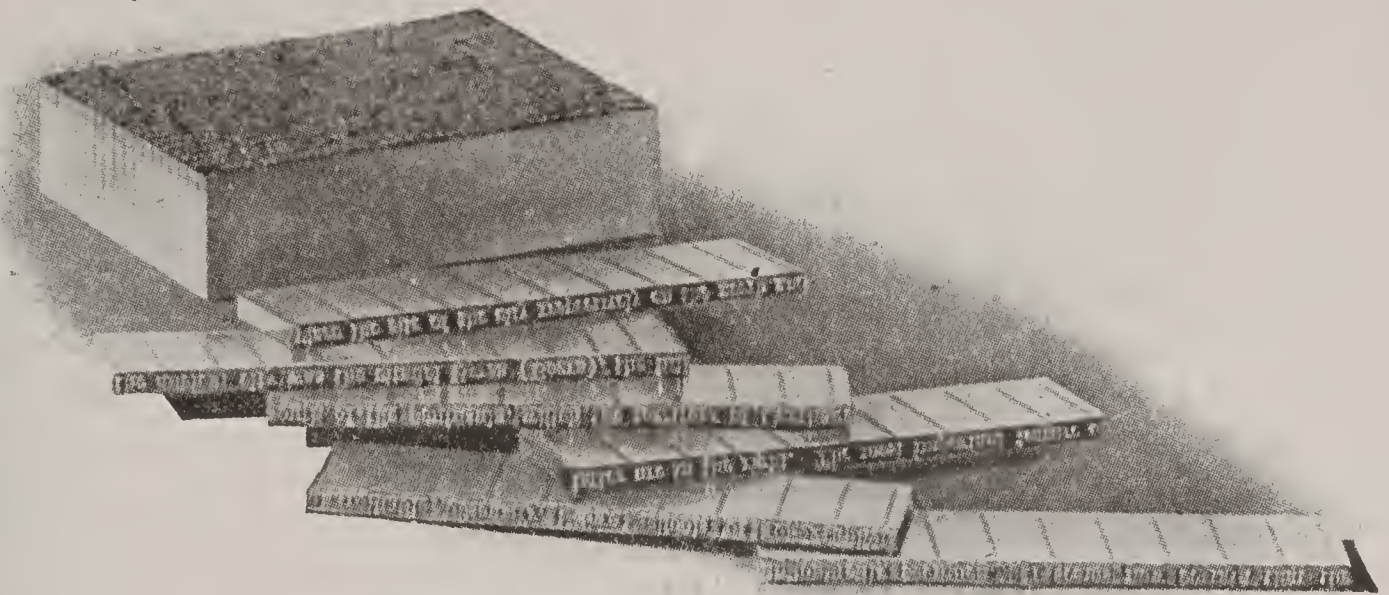
Suppose you had a pretty drawing in school that a newspaper wanted to reproduce. The engraver would photograph it much in the same manner as you had photographed your little sister with your kodak, only his camera would be larger and it would contain a sensitized glass plate instead of a roll of film. The negative would be printed on a sensitized piece of thin zinc. This print would be ink-resisting on its entire surface, with the exception of the lines corresponding to the drawing from which the negative had been made, so that

in the next operation, when the engraver runs an ink roller over the plate, the ink takes only on those lines and leaves the rest of the plate perfectly clean.

The plate is then warmed slightly and dusted over with "dragon's blood," a resinous red powder. The plate is then heated until the powder is thoroughly burnt in on the lines of the drawing. Then it is placed in a solution of nitric acid and water. The dragon's blood protects the lines of the drawing from the action of the acid, which etches or eats away the zinc between the lines. The plate is left in the acid for only a short time, for the acid must not be allowed to eat away the zinc under the lines of the drawing, or else they will break away, and the plate will be useless for printing purposes.

*The Use
of "Dragon's
Blood"*

The Linotype



This picture shows you where the linotype casting machine gets its name. You see each line of type is in one solid bar.

The plate is usually placed in the acid three times before an etching of the proper depth is secured. Each time it is taken out of the acid the plate is dried, then heated, and brushed with dragon's blood, and then burnt in hard. Thus the dragon's blood serves to protect the sides of the lines, as well as their top surfaces. At last all the lines of the drawing stand up clearly on the zinc plate. The plate then goes to the "machine room," where all the useless zinc is cut away, leaving only the line engraving, which is then mounted on a block of metal to make it type

high. It is then ready to print from.

You notice that most of my pictures are made up of little dots. Such pictures are what are called "half-tones." Half-tones are made on copper. A negative is made from a photograph, a wash-drawing, or an

object, just as for a zinc etching, but in this case the negative is made through a glass screen that is placed in the camera just in front of the sensitized glass plate. This screen is composed of ruled lines crossing each other diagonally. The number of ruled lines on this screen vary from 65 to 200 to the inch. My pictures have 120

Two of the Little Type Makers

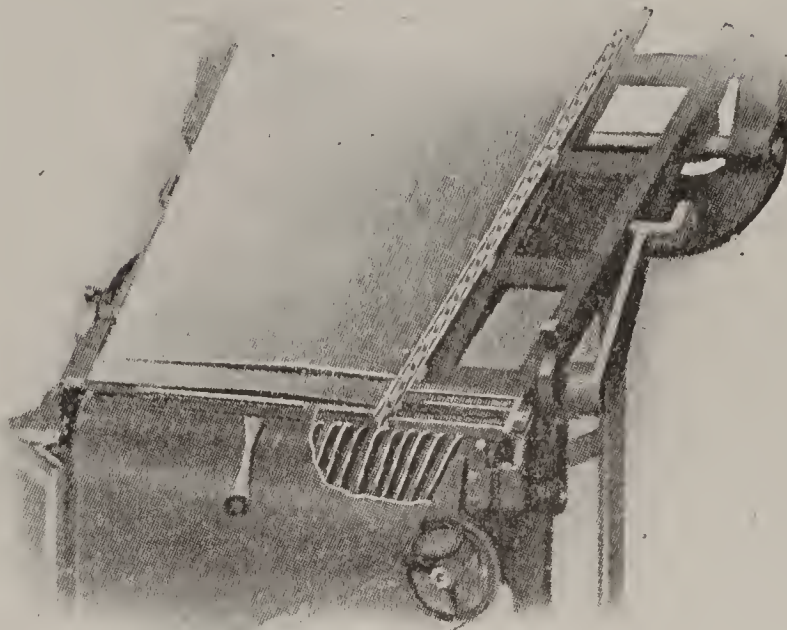


These are two of the little type makers, or matrices, in which the type which make up a line, are cast. One of them has one letter, you see, and the other two. The two-letter matrices may have one letter with a Roman face while the other may be Italic, small capital, or some other kind of type. The advantage of this is that if a line is to be composed partly of Roman face and partly of another face, the operator, by moving the lever, can determine which letter is to be cast. The principle is the same as that of the shift-key and double lettering in a typewriter.

lines to the inch. When the negative is developed it is composed of tiny dots made by the light penetrating between the lines of the screen. These dots make fine, broken lines, that reproduce the most delicate shadings of the copy. The lines in zinc etching or line engravings, you notice, are continuous and unbroken.

The colored pictures are also made from half-tone engravings,

Matrices Waiting to be "Called"

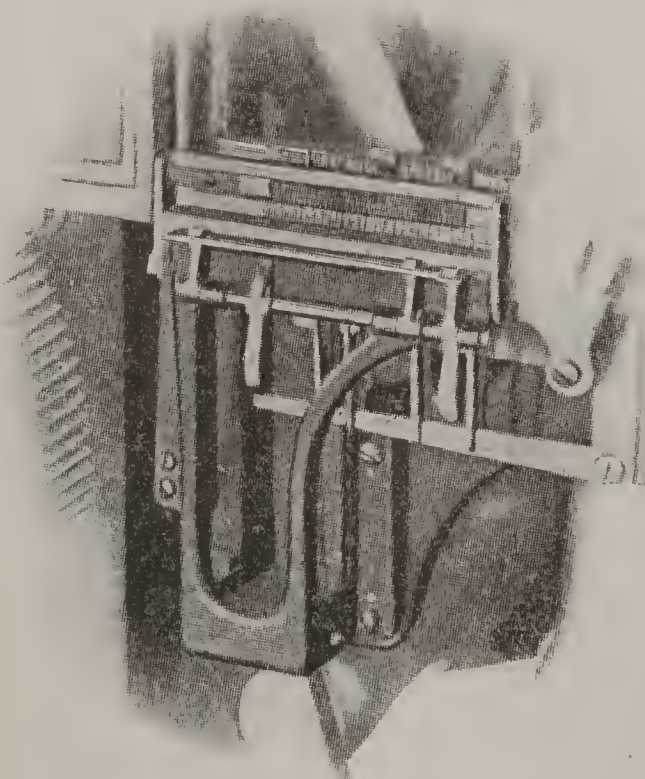


The space where the matrices are kept until they are wanted is called the "magazine." This picture shows the magazine with a portion of its cover removed to show a row of letters in their compartments. All letters in a given compartment are of one kind. When the operator presses the corresponding key on his keyboard, it releases one of these matrices and down it comes "like a boy on a toboggan slide." As the different letters follow, they line up beside one another in the assembler, like soldiers standing at attention.

three engravings being required for each picture. One engraving is to print in yellow, one in red, and the other in blue. Yellow, red and blue are the three primary colors that you learned about in school. From them all other colors are produced. By the three-color process the yellow plate is printed first.

The red plate is printed right on top of the yellow. The blue plate is then printed on top of the yellow.

The Assembler



This is the assembler. It holds the matrices of the type together much as a man setting type by hand holds them in his "stick." It has quite a lot of machinery about it in order to take care of the proper adjustment and spacing of the matrices as they drop down into line.

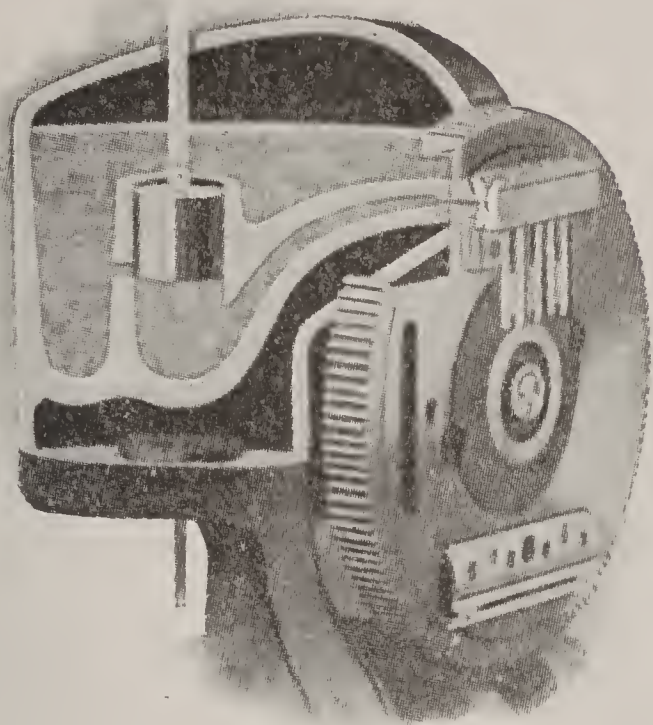
The Linotype Keyboard



This is the keyboard of the linotype. You see it is constructed on the same principle as the keyboard of a typewriter. The bar just above the keys is called the space bar. When the operator touches this bar it lets down a matrix with a blank face which thus makes a space between the words. After the assembler has been filled, the operator presses down the handle on the right which causes the whole line to pass to the front of the melting pot.

low and red. These three plates are made separately and a negative is required for each plate. In making the negative for the yellow plate a "color filter" is placed

Inside the Melting Pot



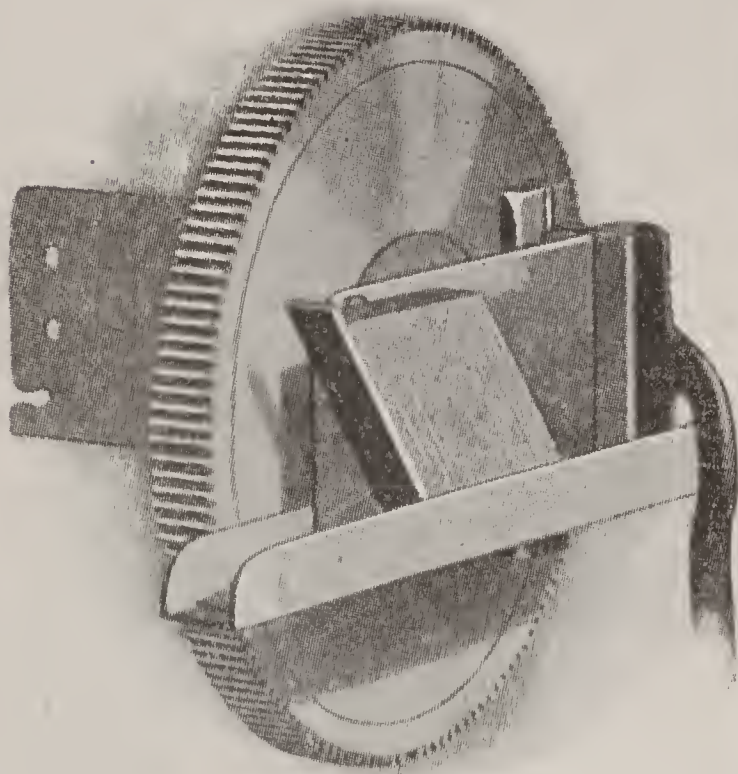
Here you see the inside of the melting pot and just how the plunger forces the metal up a tube like the stem of a tobacco pipe and fills the matrices. The line, after it is cast, you see, lies horizontally. Just pausing long enough for this thin line of metal to harden, the wheel revolves, thus bringing the slot you see on the left opposite the opening in the casting box and carrying the type which has already been cast so that it assumes a vertical position. The next picture shows what happens to this bar.

over the lens of the camera. This filter leaves out all the red and blue that is in the copy, and photographs only what is yellow. In making the negatives for the red and blue plates other filters are placed over the lens, leaving out all other colors in the copy, except the red or blue. When the three plates are printed the combination of the three colors form a picture, which is the exact reproduction of the painting from which it was made.

How and Why I Go To Bed

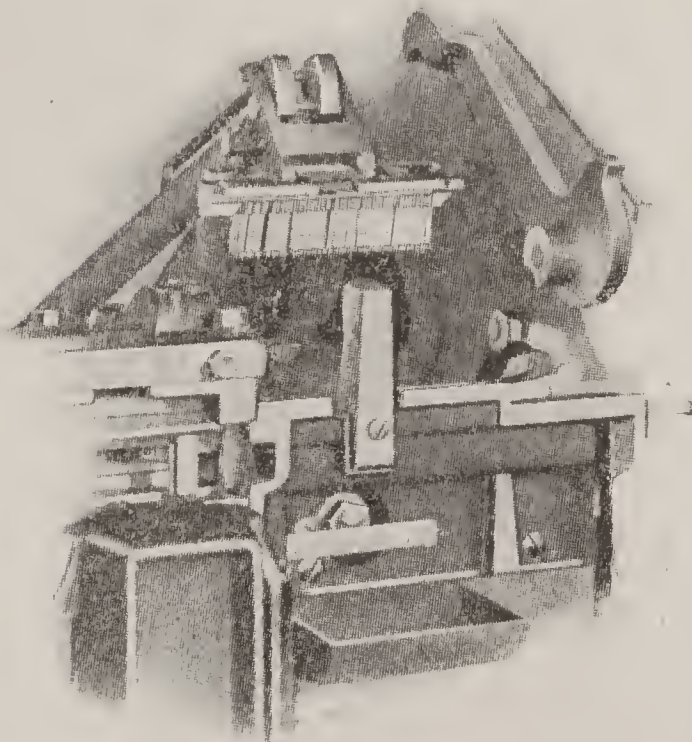
Now it is time to go to bed. To sleep? No, indeed! I'm busiest of all when my electrotypes pages are put on the bed of the printing press. Half of them are upside down. Page ten is next neighbor to page twenty-three and so on. Fold a sheet of

How the Type Gets into the Galley



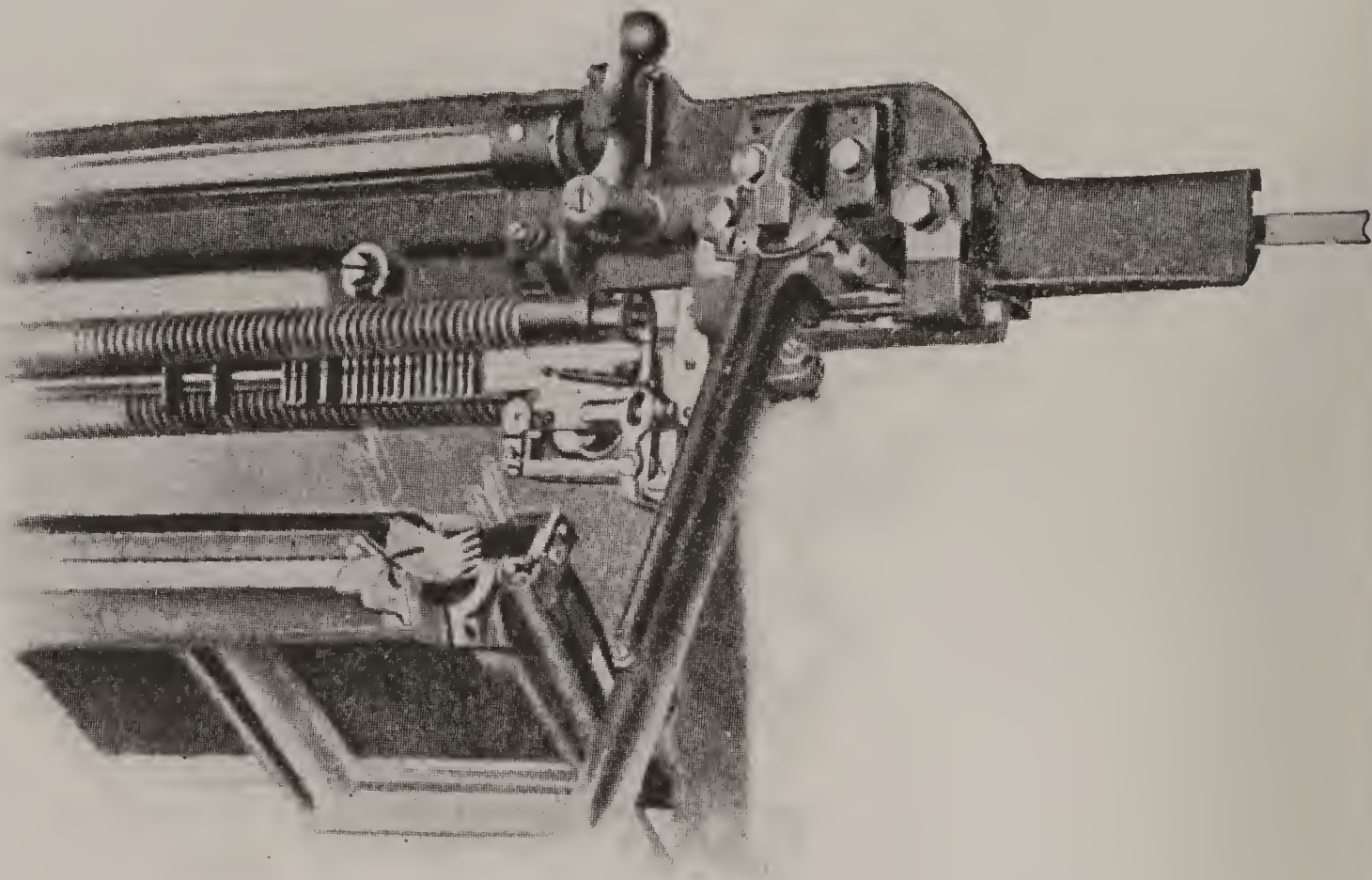
The galley is a kind of tray to hold type after it has been set. The picture shows a number of linotype slugs in one of these galleys and the new one, which has just been cast, as shown in the previous picture, is about to be added.

On the Way Back to Their Pens



Here is a row of matrices on their way back to the distributor which will drop each of them into its pen. They are here shown attached to the distributor bar which is provided with grooves and ribs corresponding to the teeth in the matrices. The matrices are pushed along the bar by a conveyor screw until they reach the point where the ribs on the bar correspond with the teeth in the matrices. Then they let go and drop into the respective channels of the magazine out of which they originally came.

The Little Type Makers Returning Home



Just watch the little brass molds go home again. Each one has notches like a Yale door key, and the notches on each matrix are different from all the rest. These teeth are in the "V" on the upper end. In the picture you see what seems to be a long screw. This is called the "distributor bar" because it distributes the matrices back into their proper places. The threads or ribs on the bar vary in number and arrangement at different points along the bar, to correspond with the arrangement of the teeth in the matrices. So you see what happens; the matrices are carried along by the screw-like motion of the bar until they reach a point where the ribs on the bar exactly fit into the teeth in the matrices. Then, presto! The matrices let go and drop down into the little pen or channel where they belong, and stay there until they are wanted again.

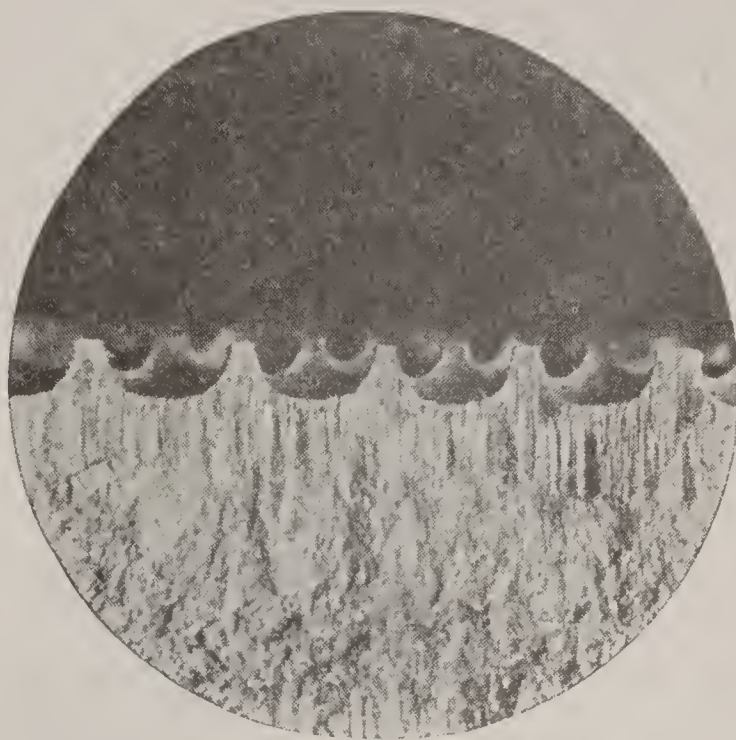
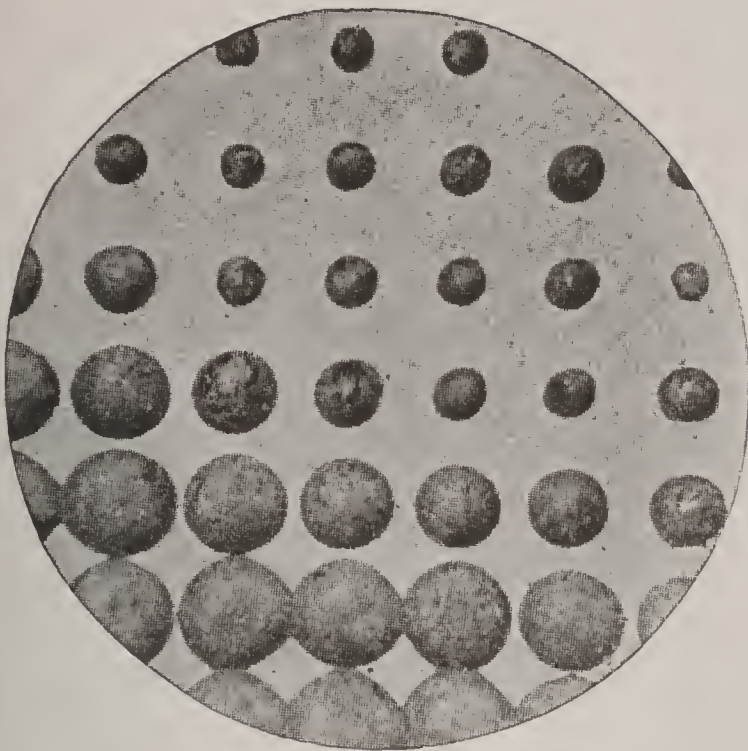
paper to make sixteen leaves or thirty-two pages. Number the pages, without cutting them, and then unfold the paper and you will see why my pages are laid out this way on the press. Thirty-two of my pages are printed on one side of a sheet and thirty-two on the other side. Printers have to arrange those pages so that when the sheet is folded, the printed plates will be where they belong. On the press bed, I feel like a Chinese puzzle, and am *so* relieved when everything comes out right.

As a sixty-four page form—so they call it—comes from the press it runs between two sharp edged wheels that fit together like the two

blades of a pair of scissors. This cutter slices the sheet into two sections of thirty-two pages each—sixteen on one side and sixteen on the other.

When the sheets first come from the press, the ink is not dry and pictures and reading matter would be smudged, if handled. After having been given time to dry, the sheets are taken to a folding machine into which they are fed. At the folding machine a very funny thing happens, for right at the "entrance," so to speak, a pair of steel fingers with rubber cups on the ends of them, like the suction cups on a fly's foot, and working on the same principle, take hold of the edge of the sheet,

The Little Dots Under the Microscope



If you will look closely at certain of the illustrations in *Pictured Knowledge*, you will note that they are made up of little dots. The two illustrations here given show how these dots look under the microscope. Where the shading in the picture is light the dots are smaller and farther apart; where the picture is darker the dots are larger and closer together. This is very clearly shown in one of our microscope pictures. The picture on the right shows how the half-tone would look if cut through. You see the "dots" stand up and do the printing.

pull it forward and stick it between two webs, running over rollers. The rollers draw the paper in much as the two rollers on a clothes wringer draw in the cloth, and it is carried forward on the webs to a point where the sheet is just above two other rollers.

At this point in the proceedings a frame comes down and pushes the sheet between these rollers which draw it through as you would run a folded cloth through a wringer, thus making a fold. Then the sheet, folded once, passes down to another web, frame, and roller combination, and so on until it has been folded five times, and thirty-two pages follow each other as you have them in the book.

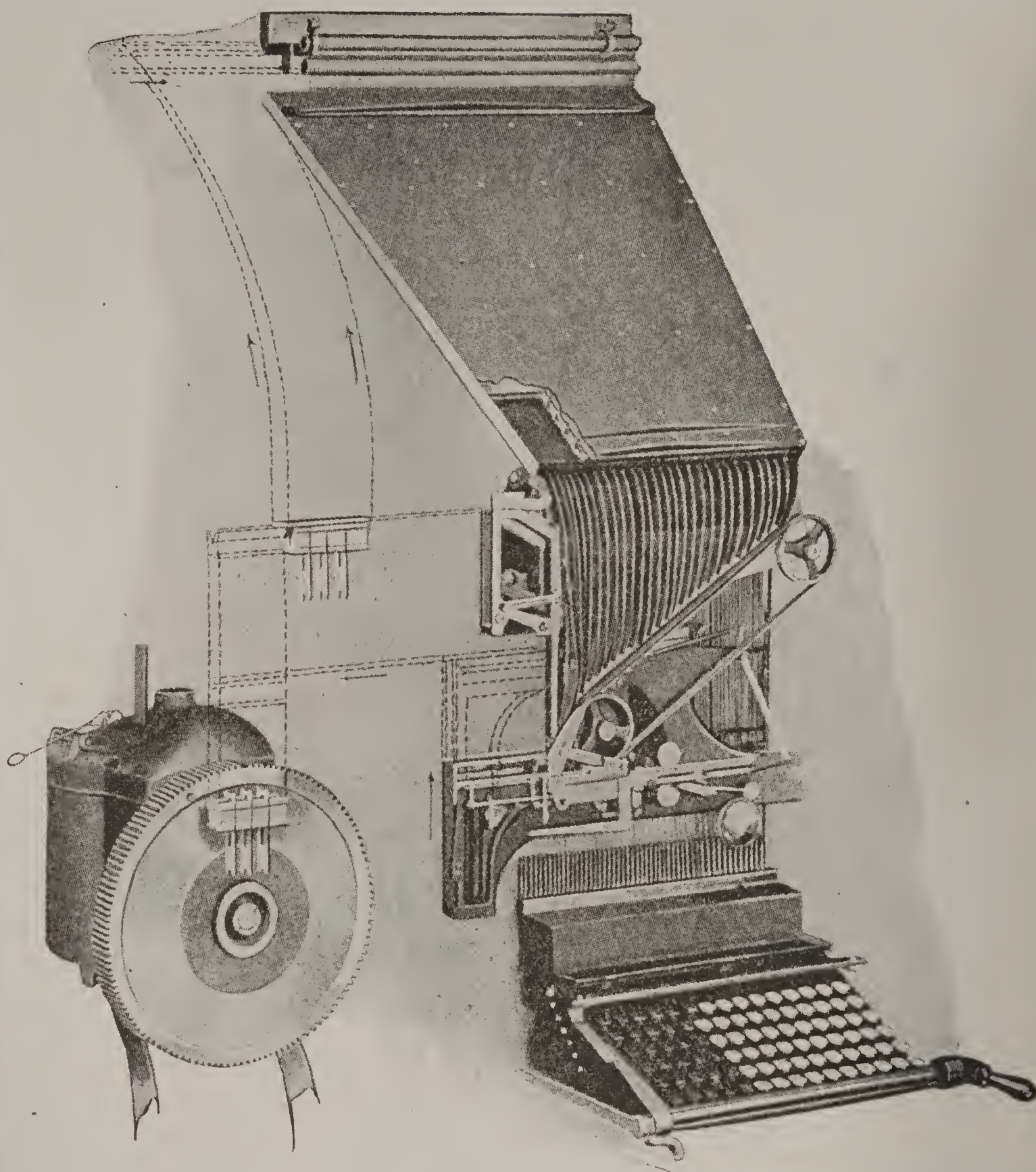
Oh, yes, the ink! A five-cent bottle lasts you a long time, but barrels of ink were used on me. And it is thick ink, made of lampblack, oil and varnish, ground in big tanks and mixed with a paddle. For the colored pictures, the inks look like the

pots of paint of a house decorator. The ink flows from a fountain at the end of the press. It

*Molasses, But
Not for
Candy*

flows onto a table. It is taken up on big rolling pins, and is spread evenly over the type. Guess what those ink rollers are made of. Glue and molasses. They are soft and elastic as if made of rubber. The glue and molasses were boiled as thick as taffy and poured on wooden cores, in iron molds to harden. The press bed is a moving table. In front, it is inked for every printing. Then it runs under a rolling cylinder with a sheet of paper wrapped around it. The sheet is printed, the table is moved forward for another inking, and the cylinder gets another sheet from the shelf at the back. A boy feeds the press with paper. He pushes a sheet up until some steel fingers reach out, catch the edge and draw it in. Then a sheet is printed, other fingers gently lift it out and lay it aside to dry. When dry the other side is printed.

Summing Up the Story



This picture sums up the whole story of the linotype and its work, so that you can see the relation of all the different parts we have been describing. Here, as in a previous picture, the cover of a portion of the magazine is removed so that you can see the "alleys" down which the letters come. The belt which carries the matrices along and lines them up for the casting machine is also shown.

The dotted lines and the arrows show you how the assembled line of matrices, just sufficient to make a line of type of the proper width, is lifted up and carried across and down in front of a slot in the cogged wheel where molten metal is forced through from the melting pot back of the wheel there, into the matrices, and so casts the line of type into a solid bar.

After the bar has been cast, that particular line of matrices is through with that job and so is carried up as you see by the arrows and that dotted line, to the distributor bar at the top of the magazine. This distributor bar causes each little matrix to find its own "pen," as described in the article.

THE MAKING OF A BOOK

An Artist at Her Work



This picture shows an artist at work in the Art Department of Pictured Knowledge. A drawing, as you see by the one on her drawing board, is made much larger than the reproduction of it which appears in a book, because when working on a large scale, the artist can handle the details of the picture more easily. Resting on the bookcase you will recognize two of the illustrations in the Little Folks' section of Pictured Knowledge. Here you meet the clever artist who drew them, Miss Betty Harris.

Big newspaper presses fold the papers and drop them in a big box.

Open me carefully. You can see that I am made in sections of sixteen pages each. All of my sections were gathered up by pretty girls in the book bindery. Then I was put into a "smashing" machine to be squeezed into a solid book. One machine sewed the sections together and another cut the edges. My back was rounded and front hollowed. (Children should be just the other way.) Coarse cloth was glued on the back, with an inch extending over each edge. Then stout paper was glued on. The cloth edges and fly leaves were pasted into the cover.

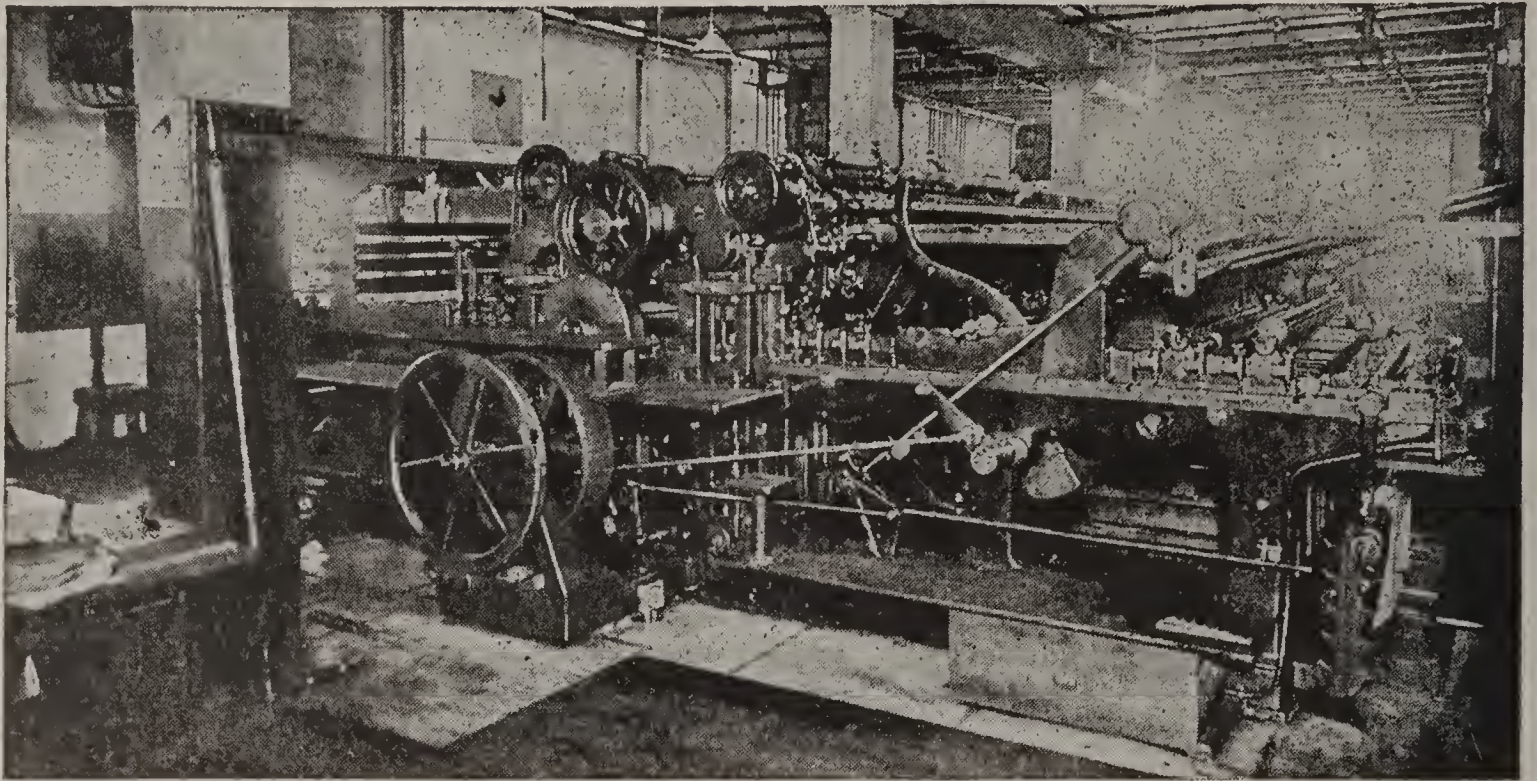
The whole cover was made by pasting. Then the cloth was put on

the sides; all the edges were turned over and glued down and the back lined. Presses made the ridges across the back and pressed in grooves for hinges. This is why it is so easy to open my front door.

A book is like a house. It has a name plate on it, so people will know who lives inside. A special workman put my name on in gold letters. He had a brass die with the name cut in it. He pasted a strip of gold leaf on in the right place, with thin glue, and then pressed the heated die into the gold, cutting around the letters and pasting them down. See my bright gold name plate?

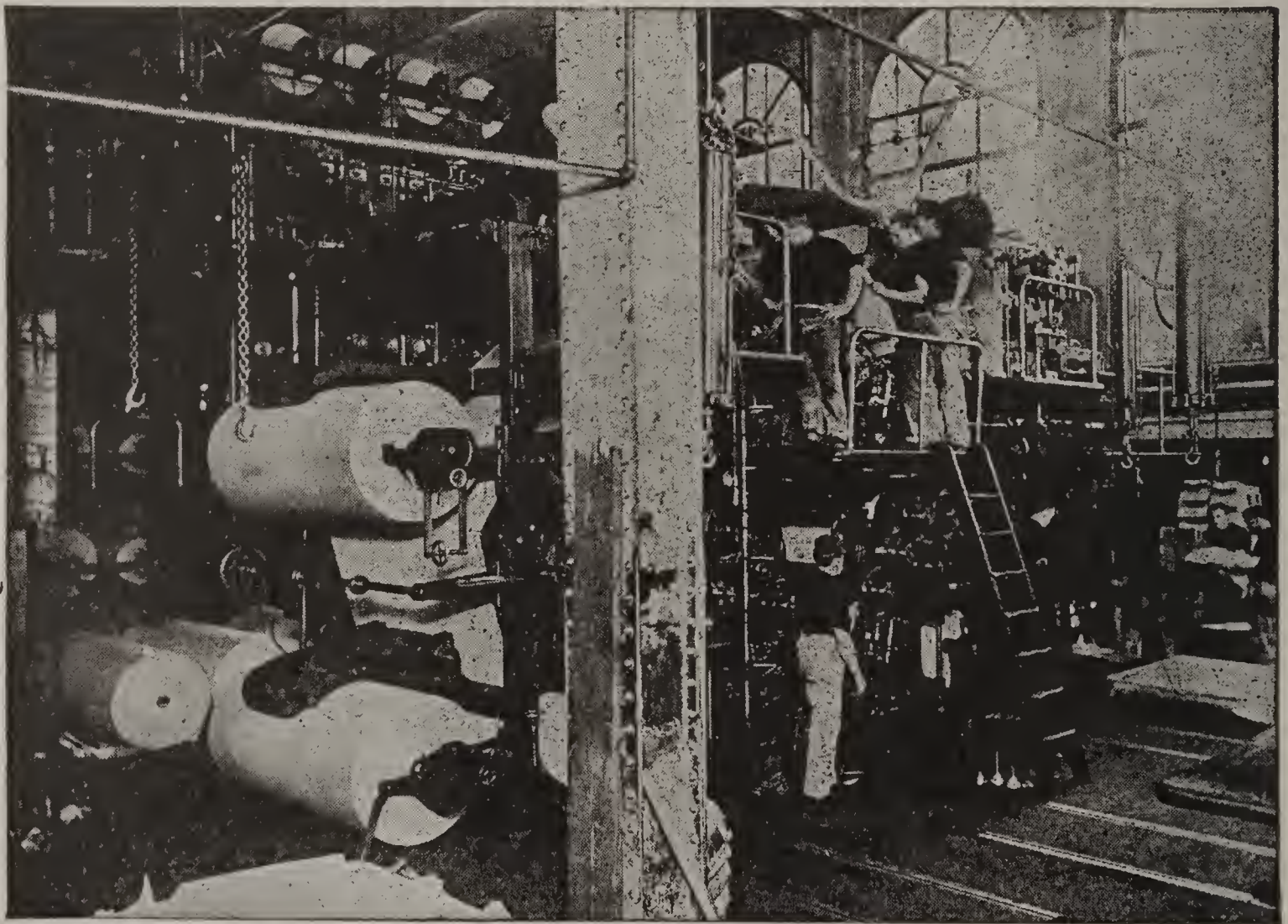
"Pictured Knowledge" lives here. Come on in. The stories and pictures are fine!

The Machine that Does the Printing



Here is a picture of one of the many presses upon which the pages of Pictured Knowledge are printed. On the right hand you see the "rolling pins" which spread the ink over the type. Underneath them is the moving table which carries the made-up type pages. On the left, leaning against the pillar, is another roller ready to take the place of one on the press in case of accident.

In the Press Room of a Great Daily Paper



This shows one corner of the press room of one of our great newspapers, the New York Herald, with the men at their posts. The pipes you see convey air used in connection with the hoists for raising those great rolls of paper. The man on the right of the pillar is the "brakeman" who starts and stops the press. The two men on the platform on the top of the stairway are putting the plates on the press. The man back of them with the sheet in his hand is the pressman, who stands in the same relation to the press that the captain does to a ship; he is in general charge. Here you see him looking at a printed sheet which was run off before the men put on the new plates. He wants to see if everything is printing properly.

THE MAKING OF A BOOK

Books for the Blind and How They Are Read



Just think what a blessing it is that even the blind can read books, although they can no longer see. In books for the blind the letters are raised by being punched into thick paper from the underside. Blind people become very expert in making out the letters by passing their fingers over them. Here in the picture one old gentleman, in an asylum for the blind, is reading to another.

Book History in a Pair of Bookholders



The above picture is a kind of summary of the history of books. It shows an Egyptian scribe with a papyrus roll spread out in his lap, reading aloud. You know it was the Egyptians who first made a kind of paper from the papyrus plant which grows in Egypt. They cut the pith of the plant into long strips, arranged them crosswise in two or three layers, soaked this mat in water and then put it under weights which pressed it into a sheet. You also see where we get our word "paper," don't you?

The Fern and the Moss

*There was a fern on the mountain, and moss on the moor;
And the ferns were the rich, and the mosses the poor.
And the glad breeze blew gayly, from heaven it came,
And the fragrance it shed over each was the same;
And the warm sun shone brightly, and gilded the fern,
And smiled on the lowly-born moss in its turn;
And the cool dews of night on the mountain fern fell,
And they glistened upon the green mosses as well.
And the fern loved the mountain, the moss loved the moor,
For the ferns were the rich, and the mosses the poor.*

*But the keen blast blew bleakly, the sun waxed high,
And the ferns they were broken, and withered, and dry;
And the moss on the moorland grew faded and pale.
And the fern and the moss shrank alike from the gale.
So the fern on the mountain, the moss on the moor,
Were withered and black where they flourished before.*

*Then the fern and the mosses they grew wiser in grief,
And each turned to the other for rest and relief;
And they planned that wherever the fern roots should grow
There surely the moss should be sparkling below.*

*And the keen blasts blew bleakly, the sun waxed fierce;
But no wind and no sun to their cool roots could pierce;
For the fern threw her shadow the green moss upon,
Where the dew ever sparkled undried by the sun;
When the graceful fern trembled before the keen blast,
The moss guarded her roots till the storm wind had passed;
So no longer the wind parched the roots of the one,
And the other was safe from the rays of the sun.*

*And thus, and for ever, where'er the ferns grow,
There surely the mosses lie sparkling below;
And thus they both flourish, where naught grew before,
And they both deck the woodland, and mountain, and moor.*

ELIZA COOK.

GREAT WORKS OF ART AND ARCHITECTURE

MASTERPIECES OF PAINTING

Masterpieces of the World of Art



The Last Supper, by Leonardo da Vinci

ART not only speaks the most beautiful language in the world but it often tells in an instant what no amount of words could convey so clearly.

A portrait or a landscape on a wall, for example, really describes the person or the scene represented; describes it so well that no one would think of hanging up a framed description in words in place of either. It is true that some things can be told in words better than in pictures but, on the other hand, there are things in pictures that can not be put into words.

Yet, although it has been truly said that art is a "universal language," and, therefore, a language which everyone can understand, it tells most to those who understand best. So it would be a strange kind of education that taught us only how to read books and nothing about how to read great works of art. And since we get the most out of books when we learn to like the great works of literature, art will enrich our lives in proportion as we become familiar with and learn to appreciate its masterpieces.

In the reproduction of masterpieces in this department of Pictured Knowledge, what are known as the Old Masters are given first, followed by the work of modern painters. Then come the great works of sculpture and famous monuments, including the work of the Egyptians and the Greeks. In the case of the Old Masters and modern artists, the

nationality and date of birth are given, so that you can not only study the work of the individual artist, but become familiar with national characteristics in art and observe the changes in style from one period to another, similar to those which mark the development of literature.

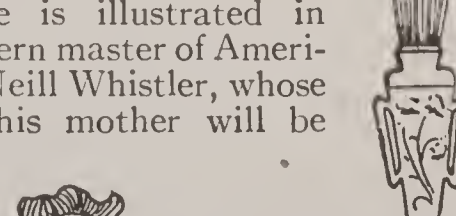
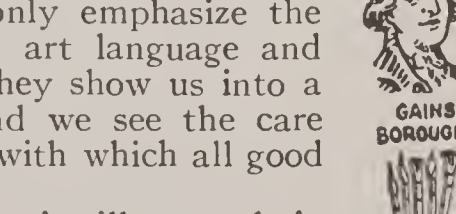
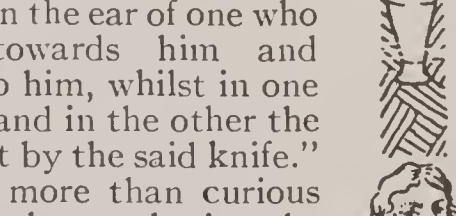
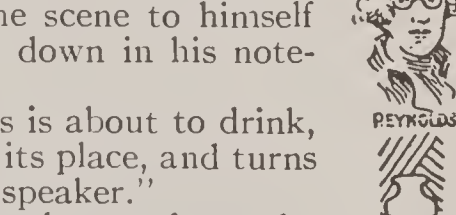
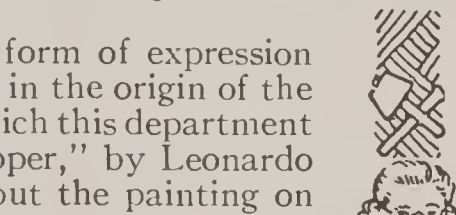
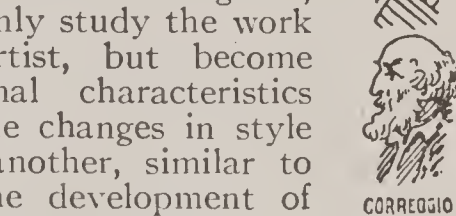
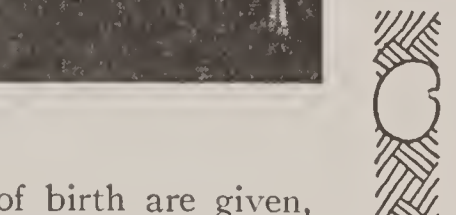
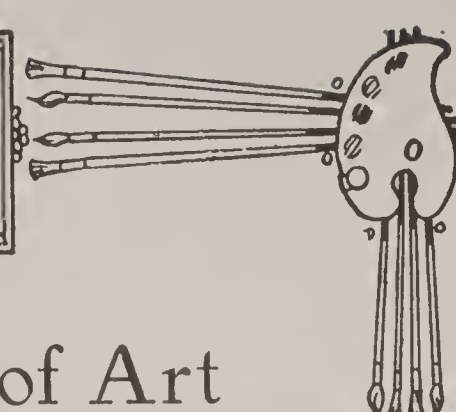
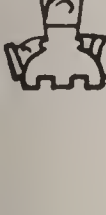
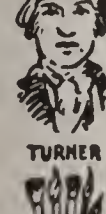
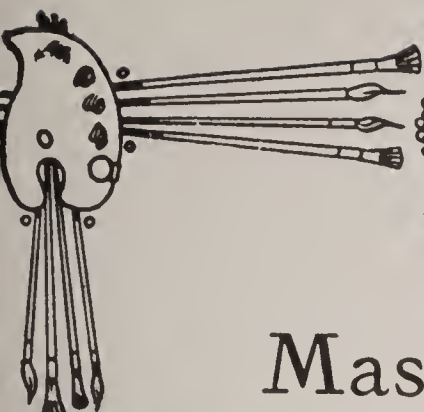
That art is only a form of expression is strikingly illustrated in the origin of the famous picture with which this department begins, "The Last Supper," by Leonardo da Vinci. Before he put the painting on canvas, he pictured the scene to himself in words and wrote it down in his notebook. For example:

"One of the apostles is about to drink, but leaves the glass in its place, and turns his head towards the speaker."

"Another whispers in the ear of one who hearkens, bending towards him and holding his ear close to him, whilst in one hand he holds a knife and in the other the bread, which is half cut by the said knife."

These notes are of more than curious interest. They not only emphasize the important relation of art language and word language, but they show us into a great man's mind and we see the care and patient industry with which all good work is done.

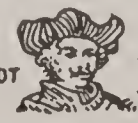
A similar practice is illustrated in an anecdote of a modern master of American birth, James McNeill Whistler, whose famous portrait of his mother will be



RUBENS



REMBRANDT



found among these reproductions. Walking in London one evening with a friend, the latter called his attention to a striking effect of a sunset with a sky line of buildings.

"I want that," said Whistler, and stopping, he studied the scene intently for some time. Then turning his back on it he said to his friend, "See if I can recite it," and he described minutely the features of the scene.

On the way back to the studio his friend called his attention to another view. "No," said Whistler, "one thing at a time." And as soon as he got to his studio he began putting one of his famous "nocturnes" (night scenes) on canvas; the sunset which he had just learned and recited.

You will also find when you are trying to draw something at school or in the little evening group at home, that your picture will be much better if you first describe the object either to yourself or to someone else; as to its dimensions, resemblance of its parts to other forms or objects, etc.

You will also find that the better you learn to draw, fol-

lowing the instructions in our Department on Drawing, the more you can see and appreciate in the work of the masters. It was to develop appreciation of art rather than to make more artists, that the Greeks, the greatest of all nations in art, taught drawing in their schools. They did this that the little Greeks might get the most out of the art which

they saw everywhere around them. In sculpture alone this little nation left so many and such marvelous works, that one might suppose that every other boy became an artist, if it were not for the fact that they also produced poets, orators, statesmen, architects, generals, mathematicians, and philosophers—so many and so great.

And the greatness of the Greeks in every line was in no small measure due to the clear seeing and clear thinking which grew out of the fact that art was so intimate a part of their religion and their daily lives. That statue of the "Winged Victory," for example, was a prayer of thanksgiving in marble.

The Praying Hands, by Albert Dürer



Albert Dürer (German, 1471)

LIKE Da Vinci and Angelo, Albert Dürer was a man of many talents—sculptor, architect, painter, and etcher. He was also a man of strong religious feeling and expressed this feeling in the books he wrote, but above all, in his art. Even in the picture of the

hands raised in prayer he has put a world of adoration and humble trust. To even draw hands correctly is one of the difficult things in art; and to make them express thought and character, as Dürer does here, is still more difficult.

Mona Lisa, by Leonardo da Vinci



Leonardo da Vinci (Italian, 1452)

THIS is one of the most famous portraits in the world. It owes its reputation, not alone to its great artistic merit, but to the mystery in the lady's face. Upon one point the critics are agreed, and that is, that it expresses the painter's ideal of womanly beauty and his conception of the mystery,

not only of human life, but of inanimate nature symbolized by the mountains and the grace of the curving stream in the background. While Leonardo was painting the beautiful Mona Lisa, he kept someone near her to sing or play or jest or amuse her, that she might continue cheerful.

Jeremiah, by Michelangelo



Michelangelo Buonarroti (Italian, 1474)

THIS figure of Jeremiah is one of the seven figures of prophets in Angelo's colossal painting, "The Last Judgment," in the Sistine Chapel. The prophets and also the sibyls, who were the prophetesses of Greece and Rome, and are represented as foretelling the birth of Christ, occupy spaces in the ceiling. The great artist's conception of Jeremiah, who is often called "The Weeping

Prophet," is the most striking of all. His profound sorrow over the sins of his people and the calamities that must befall them is expressed in both face and attitude. One of Angelo's distinctions was his perfect knowledge of anatomy, to which he devoted twelve years of study. The fact that he was a sculptor led him to emphasize the muscles in the human form.

St. Christopher and the Christ Child, by Titian



Titian Vicilli (Italian, 1477)

TITIAN has here told with his brush an interesting legend. St. Christopher's original name was Offerus, and he was the son of a heathen king. He was of extraordinary size, as you can see. He was correspondingly strong, and started out into the world to offer his services to the strongest and bravest. For a time he served Satan, but left him when he saw Satan frightened at the sight of a roadside cross. Later a

Christian hermit baptized him and named him Christopher. The name was prophetic, for it means "Christ bearer." One day when St. Christopher was carrying people across a stream, in the service of God, he took a little child on his shoulder, but found the weight so heavy that, giant as he was, he could hardly carry him. This is the episode told in the picture. The child of course, was the Christ Child.

The Sistine Madonna, by Raphael



Raphael Sanzio (Italian, 1483)

THE Sistine Madonna is probably the most famous painting in the world. The great merit of the picture lies in the beauty and purity of the mother's face and the remarkable combination of baby innocence and mature wisdom in the face of the child. The treatment is very simple. Relatively few lines, for example, express the flow of the draperies in the breeze, as the mother advances with the child through the clouds, typifying the fact that she brought the

Christ Child to the world. Here we have reproduced the two most striking figures in the painting, that of the Christ Child and his mother. As no sketch is known to have existed for this picture, it is thought that Raphael painted it directly upon the canvas without the preparatory studies of separate figures, which nearly always precedes the beginning of a painting in its final form.

Only Raphael's wonderful skill as a draughtsman enabled him to do it.

Bacchus, by Guido Reni



Guido Reni (Italian, 1575)

GUIDO RENI owed part of his fame to his skill in painting classical subjects. His masterpiece is "The Aurora," which represents Apollo, the god of day, starting out in his chariot attended by the Hours represented by female figures, after the manner of the Greek myths. The painting

here reproduced is his conception of the childhood of Bacchus, the classic god of the vineyard. You notice the little children are crowned with vines and grapes, and their whole attitude, as well as the expression of their faces, tells of the happy time of harvest and the vintage.

The Garland of Fruit, by Rubens



Peter Paul Rubens (Dutch, 1577)

ANOTHER picture of happy children, symbolizing the fruit time of the year. Notice how beautifully the little figures are

grouped to correspond with the shape of the circular garland they are carrying. "Composition" is one secret of great art.

The Surrender of Breda, by Velasquez



Diego Rodriguez de Silva y Velasquez (Spanish, 1599)

VELASQUEZ was distinguished not only as a portrait painter but as a painter of historic subjects. This picture is in the Prado (Royal Picture Gallery) in Madrid. It represents the Marquis de Espanola, a

famous Spanish general and friend of the artist, receiving the keys of the city of Breda, which he has just captured. Note that the conqueror treats the defeated general with the greatest courtesy.

The Laughing Cavalier, by Hals



Frans Hals (Dutch, 1580)

THIS picture has won its fame under the title of "The Laughing Cavalier," although as you can see plainly, the gentleman is not laughing. He has something of a smile, to be sure, but it is a smile of irony. Somebody has apparently told him something—and he means to say by this smile: "You would hardly expect a man of the world like me to

be taken in by that story, would you?" People smiling and laughing are among the favorite subjects of the brush of this famous artist. He painted very rapidly and got his results with relatively few quick strokes of his brush. Vandyke was also famous for the rapidity and certainty with which he used his brush.

Madonna with the Donors, by Vandyke

VANDYKE was a pupil of Rubens. He seems to have inherited artistic talents from his mother, who was a skilled worker in embroidery and tapestry. Although he belonged to the Flemish School of painters by birth and training, he spent much time in England, where he painted the King and members of the Royal Family, and got his title of "Sir." The picture "The Madonna with the Donors" is one which was painted as a gift to the Church, and as was often done, the artist included the portraits of the donor and his wife in the picture. The Virgin has the typical face of the aristocrats whom Vandyke was accustomed to paint. The child with one hand holds his mother's finger, and with the other is stroking the cheek of the donor.



Sir Anthony Vandyke (Flemish, 1599)



Bartolme Esteban Murillo (Spanish, 1617)

The Beggar Boys, by Murillo

ALTHOUGH equally famous as a painter of sacred subjects, Murillo was very fond of painting the happy-go-lucky street boys of his native country; and particularly boys of the city like those shown in the picture. All these boys were rich and happy because, although they had nothing, they were used to doing without what they didn't have. Enough to eat, a sunny place in which to play, was all they asked of life. Another painting by Murillo called "The Melon Eaters" almost exactly reproduces the figures in this picture. Another shows three little beggars squatting by a ruined wall.

FAMOUS WORKS OF THE PAINTER

The Syndics, by Rembrandt



Rembrandt Harmens van Ryn (Dutch, 1606)

THIS picture of the "Syndics" (government officers) brings out two of Rembrandt's greatest characteristics—his expression of

character and his striking contrasts of light and shadow. On account of this phase of his genius he has been called the "King of Shadows."

The Waterfall, by Ruysdael

RUYSDAEL was a poet who wrote his poetry with a brush. He expressed the poetry of the woods and sky, and the grace of the waterfalls. Notice the sharp contrast of light and shadow in this landscape and compare it with the handling of shadows in the group of faces in Rembrandt's "Syndics."

His pictures have been called romantic because they suggest all sorts of romantic



Jacob Ruysdael (Dutch, 1625)

things—fairies, knights riding forth in quest of adventure—anything you like.

To most people there is also a pleasant feeling of melancholy and loneliness about his pictures. The sense of being alone with Nature is, to everyone who loves her in her various moods, a very agreeable one. A picture of Niagara Falls with a lot of people in the scene, for example, is not nearly so appealing as the Falls alone.

PICTURED KNOWLEDGE
The Avenue of Trees, by Hobbema



Meyndert Hobbema (Dutch, 1638)

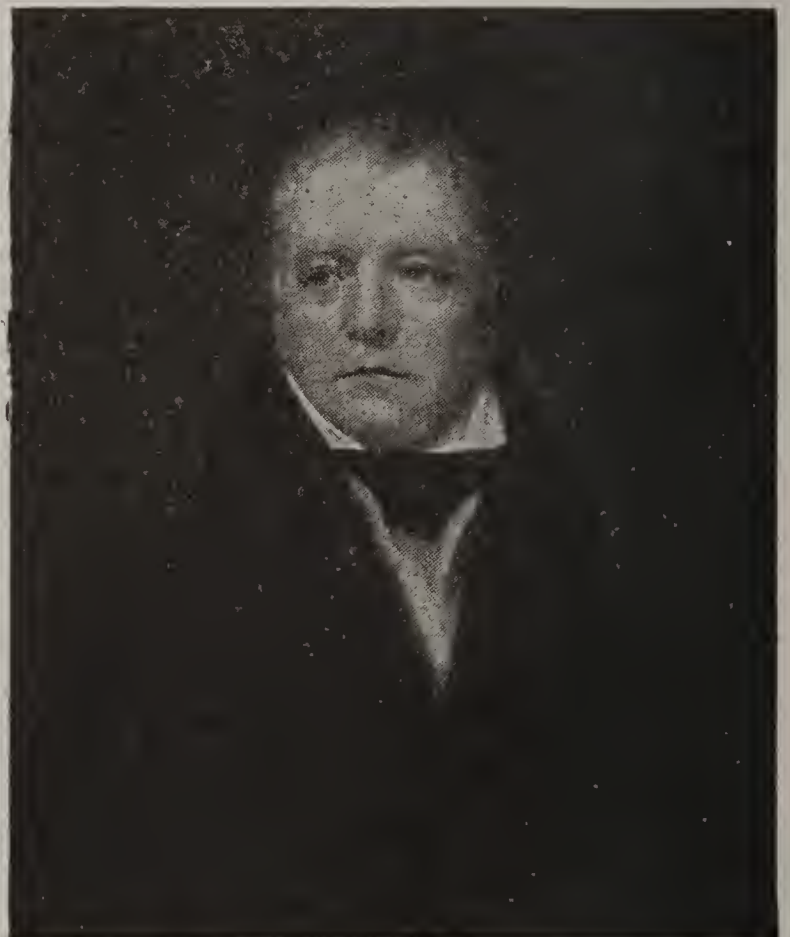
HOBBE**MA** is another great Dutch landscape artist, and like most distinguished landscape painters, he chose his subjects from his native land. You have only to look at this picture to see that it is the level landscape of Holland.

Work of Reynolds and Raeburn



Sir Joshua Reynolds (English, 1723)

REYNOLDS is the most famous of English portrait painters. The picture called "The Angels' Heads" is, in reality, a portrait of little Lady Gordon in five positions.



Sir Henry Raeburn (Scotch, 1756)

SIR HENRY RAEBURN was the most famous of the Scotch artists of his time. He produced strong, broad effects by comparatively few swift strokes of the brush.

Ulysses Deriding Polyphemus, by Turner



J. M. W. Turner (English, 1775)

THIS is one of the most celebrated pictures of one of the most famous of all painters of landscapes and the sea, the English artist, Turner. The event referred to in this picture is one you know about from reading the myth stories. Polyphemus was one of the Cyclops—dreadful big giants with only one eye, right where the little girl had that beautiful curl—in the middle of his forehead. Polyphemus lived in a cave on the coast of Sicily, and although he had large flocks of sheep, he also ate people, as did that giant Jack killed. Odysseus returning from Troy, landed on this coast with his companions and Polyphemus had shut them all up in a cave to keep for his meals, blocking the cave with a big rock. But Odysseus, who had a great deal of practice in getting out of the troubles into which he was constantly falling, put out the giant's eye while he was asleep. Then he and his companions hurried down the shore to their ships. But they had just fairly started when Polyphemus, blinded as he was, made his way to the shore, and proceeded to hurl a big rock down where he thought they must be. As he could no longer see to aim straight, however, neither Odysseus, nor his companions and ships, were touched and Odysseus mocked the furious giant as they rode away on the sea. According to Homer, this is what he is saying in the picture: "Cyclops, if any mortal man asks you the story of the blinding of your eye, say that Odysseus made you blind."

The arched rocks you see in the picture are the ones you have noticed often in the reproduction of the painting of the island of Capri, used in your picture studies in school. "Ulysses" is the Roman name for Odysseus and Turner chose it in naming his picture.

A striking feature of Turner's work is the blazes of colored light such as you can see suggested in the sun's rays here. Ruskin, the great English art critic who did more than anyone else to make Turner famous, has this to say of the sky in this picture:

"The whole heaven—one scarlet canopy—is interwoven with a woof of waving flame, and tossing, vault beyond vault, as with the drifted wings of many companies of angels. . . . When you can look no more for gladness, and when you are bowed down with fear and love of the Maker and Doer of all this, tell me who has best delivered this, His message unto men!"

Turner contributed 259 pictures to the Royal Academy, and over 19,000 drawings and sketches were mounted and arranged by Ruskin. His illustrations of the poems of Rogers, Byron, Scott, and other authors are well known. Among his paintings are Dutch Boats in a Gale, Falls of the Clyde, Sun Rising through a Mist, The Fighting Temeraire, Bay of Baiæ and Childe Harold or Modern Italy.

His large fortune was left to found a home for needy artists. Wasn't this a fine thing for a great artist to do?

Castle Grandolfo, by Corot



Jean-Baptiste Camille Corot (French, 1796)

THERE is always a spirit of joyousness about Corot's paintings that reminds one of the song of birds in spring. And they

nearly always have a suggestion of the air and the light and the odors of morning. It was always at the very earliest morning hours that he went out to paint. Indeed, he thought getting up early in the morning was one of the most delightful things anyone could do. Once in a letter to a friend he said, "The landscape painter's day is delightful. He gets up at three in the morning, before sunrise, and watches the way everything trembles in the freshening breeze of dawn."



Constant Troyon (French, 1810)

Returning from Market, by Troyon

LIKE Corot, Troyon was a great French landscape artist, but unlike Corot, he made figures of people and animals prominent features of his pictures. He also loved the morning and evening lights and their long shadows. As one critic says, he had "a quick sense for light." In the picture here produced, the light is from the setting sun, as the farmer and his wife and boy are returning from market. Like many other artists, Troyon seldom completed one subject before he took up another, working on a number of pictures at the same time and passing from one to another as a thought occurred to him.

The Gleaners, by Millet



Jean Francois Millet (French, 1814)

NO ONE has expressed the life and simple dignity of the French peasant so well as Millet. He was himself a farmer boy, and this picture of "The Gleaners" is one of his most famous works. Like Angelo, he was a close student of the human form. Notice how forcibly he brings out the shape and movements of the body here. The figures, although clothed, look like moving statues.

Although in the beginning of his career he painted classical subjects, he soon abandoned this field and devoted the rest of his life to painting scenes in the lives of the peasants of France. His pictures give a complete study of the life and character of the French peasantry which it would take several volumes to explain if the same subject were dealt with in print. Millet's work differs from other famous artists, such as Jules Breton, who also devoted themselves to painting the lives of peasants. You no doubt know Breton's "Song of the Lark." Breton put a good deal of poetic sentiment into his pictures, while another famous painter in this field, L'Hermitte, expressed the protest against a state of society in which people toil so hard and get so little

out of life. Millet, however, simply painted the peasant as he is, without any comment one way or the other.

Millet used to amuse his children and his grandchildren by making little sketches. They are comparatively crude, as are the first sketches made by an artist when compared with his finished work. One of them shows a child trying to blow out a candle. It was made for the artist's first grandchild before he could talk. Millet used to draw many things in this way to see if the baby could recognize them. When he made this sketch and showed it to little Antoine, the baby looked at it for a moment and then turned and blew at a candle which was standing on the table. The candle is shown very large in proportion to the human figures. It was made large to attract the baby's attention. In commenting on it to an American who was visiting him, Millet said, "This well illustrates a principle in painting. It is necessary to exaggerate or to bring things out in strong relief at times in order to produce the proper effect."

These sketches were made with a match dipped in ink so that the lines would be good and strong.



Jean Louis Ernest Meissonier (French, 1813)

The Print Collector, by Meissonier

THE art of Meissonier and Millet dealt with entirely different subjects and there is an equally striking contrast in their methods. Millet got his results with a few simple strokes, while Meissonier's work is distinguished by its incredibly minute detail. Most of his pictures were painted on very small canvases, and the detail is brought out with the minute accuracy of a photograph. No one has ever excelled, few have ever approached him in his chosen field. Nearly all his paintings are military scenes. His masterpiece, "Friedland—1807" is in the Metropolitan Museum, New York City.

Menzel, a German artist, an example of whose work appears below, was also distinguished for the detail in his pictures and his work has been compared by the French critic, Michel, to that of the French masters, which is the highest compliment a French critic could pay.

A Concert at the Court of Frederick the Great, by Menzel



Adolf-Friedrich-Erdmann Menzel (German, 1815)

Whistler's Portrait of His Mother



James McNeill Whistler (English, 1834)

ALTHOUGH Whistler was born in America, he spent his art life in England and so is classed among English painters. He was a painter of landscapes, of portraits, a decorative artist, and an etcher. In all these lines he ranked among the first. His portrait of his mother is one of the most famous of the world's great pictures. It is extremely simple in arrangement and treatment. The face wears the dreamy expression of those who live rather in the past than in the present. Joseph Pennell, the famous American etcher, speaks of the expression of resignation in the tired old folded hands. The face is wise and strong, full of courage and resource, and at the same time of tenderness, piety, and resignation. Only writers and artists can fully appreciate what infinite toil is required to reach the simplicity of this picture. It seems to express the beauty of motherhood, like the one word "Mother"—without adjectives and florid

sentiment. Not a touch is wasted and there is no trace, except to those who know how long it takes to write a short letter, of the amount of work really expended on it.

Whistler was deeply attached to his mother, and her influence was a dominant feature in his life. To the public, one of Whistler's characteristics was his cynicism; but in this picture he takes off the mask and shows us the real man. One of his biographers relates how once when he was visiting Whistler, they stood together looking at this picture. "I spoke at length," he says, "of the beauty of the face and figure. For some time Whistler said nothing, his hand was playing with the little tuft that he wore on his lower lip. Finally he spoke.

"'Yes,' very slowly and very softly, 'one does like to make one's Mummy just as nice as possible.'"

It was because Carlyle liked this picture that he himself consented to sit to Whistler.

The Monarch of the Glen, by Landseer



Sir Edwin Landseer (English, 1802)

LANDSEER, like Rosa Bonheur, devoted his life to the painting of animals, and the deer in his native haunts among the wild mountains of Scotland was one of his favorite subjects. "The Monarch of the Glen" shows a magnificent stag with his head thrown back, in the characteristic way, looking about for signs of danger or the presence of a rival. Behind him are his native crags and the Scotch mists. What an air of wildness and solitude the artist has put into this picture. Another painting of a deer, which is full of pathos and offers a bitter comment on the kind of sport which finds pleasure in hunting and killing these beautiful creatures, is called "The Sanctuary." A stag, desperately wounded, is just struggling up on the shore of a lake which he has swum across to reach an island where he will be safe, for a time at least, from the cruel hunter and cruel dogs. The scene is at

twilight and you can see the evening glow along the low-lying hills. Another picture shows a stag in the dead of winter, with snowy mountains all about him and the stars glittering overhead, calling a challenge across a lake to one of his rivals. "The Deer Pass" shows a group of deer among mountain peaks and morning mists.

Landseer was perhaps even more famous as a painter of dogs; not because he painted them any better, but because he painted so many pictures of dogs and brought out so many phases of their noble lives.

Of his picture "The Highland Shepherd's Chief Mourner," which shows a shepherd dog with his head resting on his master's coffin, Ruskin says in his "Modern Painters":

"[It is] one of the most perfect poems or pictures (I use the words as synonyms) which modern times have seen."

Weaning the Calves, by Bonheur



Rosa Bonheur (French, 1822)

ROSA BONHEUR shares with Landseer the distinction of being the most famous of animal painters. She came of an artistic family. She was the oldest of four children, all of whom were artists and all devoted their art to animals. Auguste painted both animals and landscape. Juliette painted animals and Isidore was a sculptor of animals. Rosa's father, who was also an artist, taught her to draw. Her work was extremely accurate and also as a critic put it, "manly and firm." The work of women artists is often delicate and hesitating. Wherever she introduces human figures into her pictures, there is a marked difference in treatment, the figures being treated as if they had comparatively little interest for the artist. Painters, like the rest of us, are apt to emphasize in their work what interests them most, and are strongest along the lines of their enthusiasm and comparatively weak in other things. Landscape artists, as we have seen, often treat figures as mere incidents or like Hobbema, get other artists who are better at figures to put them into their landscapes. Claude, a famous French landscape artist, used to say that he sold his landscapes and gave away the figures.

Although France has produced many dis-

tinguished painters of animals, Rosa Bonheur is given first place by most critics. An American critic, S. G. W. Benjamin, in comparing her work with that of Troyon and Landseer, says there is the same intense observation and sympathy with nature, the same vigor of treatment, and that she has "more refinement than Troyon with rather less power, but more power than Landseer, so far as the representation of cattle is concerned."

The studio of the Bonheurs in the suburbs of Paris has been described as "a veritable Noah's ark with its menagerie of birds, hens, ducks, and sheep." Every day the two boys took the sheep from the apartment down the six flights of steps and to the plain of Monceau where they could pasture. Later when the family had a larger income, they moved to a beautiful residence in the fashionable part of the city and a place was hired for the animals in the suburbs.

When Rosa Bonheur began to paint, it was so unusual for a woman to do such things, that in visiting the slaughter houses of Paris where she could see cattle, she dressed in men's clothes and wore her hair short to protect herself from the ill-mannered curiosity of the workmen.

The Prophets, by Sargent



John Singer Sargent (American, 1856)

ALTHOUGH the art life of America is too short to have produced many artists, it has produced a few who rank among the very best, and Sargent is one of them.

Hercules Struggling with Death, by Leighton



Sir Frederick Leighton (English, 1830)

IT IS said that no one since the days of the Greeks themselves has succeeded in entering so thoroughly into the classic spirit as Sir Frederick Leighton. Most of his paintings—certainly the most famous ones—are

scenes from Greek life and Greek myths. This picture represents Hercules struggling with Death for the possession of the body of Orestes. Notice that there is nothing hideous about the face or figure of Death.

The Golden Stairs, by Burne-Jones



Edward Burne-Jones (English, 1833)

BURNE-JONES not only painted poetry as so many painters do, but he was a highly idealistic poet and painted scenes, not of this world but of a world of beauty of his own creation. Sidney Colvin, an eminent English critic says: "A flower painted by Burne-Jones is like a flower described by Keats; all the fragrance and color and purity are caught and concentrated in magic pencil strokes."

Many of his subjects, like the Golden Stairs, are purely decorative and for that reason particularly ideal in treatment. The drawing of the human form is wonderfully well done. The scene as a whole has an archaic effect, like the use of ancient forms of words by a writer. They seem to carry us into times and scenes when people lived lives far different from our own. This picture represents a winding procession descending a stairway—perhaps to some beautiful religious festival. The movement of the figures and the grace of the curving lines is like the grace and movement of a song.

Burne-Jones is classed among the Pre-Raphaelites, but free from the extravagances of that school of art. In 1881 he received from Oxford the honorary degree of D.C.L., and in 1885 was elected President of the Royal Birmingham Society of Artists and made an Associate of the Royal Academy of Arts, London. The latter he resigned in 1893 when he became one of the founders of the New Gallery, where, and at the Grosvenor Gallery, in the British metropolis, most of his pictures were first exhibited.

The Swimming Boys, by Sorolla



©Hispanic Society of America

Joaquín Sorolla y Bastida (Spanish, 1863)

THE work of Sorolla has been compared, for the strong suggestion of movement, to the work of one of the Italian Old Masters, Botticelli. Sorolla paints boys and girls as Botticelli paints his swift nymphs and the wind-gods. In both there is the joy of motion and the suggestion of the rush and tingle of the life of youth. These boys are as nimble as little frogs and as unconscious as the frogs that there is anything in life to feel sad about. There is no posing, there are no artificial attitudes in Sorolla. These boys are not swimming as some painter might imagine boys should swim in order to be most graceful, but they are kicking about with the impulse of the moment and the skill acquired by long practice. And even in this reproduction in black and white, you can realize that one of Sorolla's distinctions is his ability to reproduce on canvas the brilliant sunshine playing through the blue waters of the Mediterranean. Some one has said you can even taste the salt of the sea and feel its bracing winds when looking at Sorolla's canvases. Of course, to do this

you must give your imagination full play.

Sorolla, beside being given high rank by the critics, is also very popular with people who have never made a study of art. This picture, as well as another called "The Bath" representing little girls splashing about in the water in brilliant sunshine, always attracts visitors at the Metropolitan Museum of Art in New York City, where the originals of both pictures are to be seen.

Like Murillo and Velasquez, a Spaniard by birth, Sorolla received his art education in his native town, Valencia, and in Paris and Rome. His first great success was "Another Margaret" which was awarded a gold medal in Madrid. His reputation grew rapidly and he was soon given the first rank among living Spanish painters. His "Fishermen's Return," first shown to the public at the Paris Salon, was purchased by the French government for the Museum of the Luxemburg.

In recognition of the merit of the works he showed at the Paris Exposition of 1900 he was made a Knight of the Legion of Honor, and in 1906 an officer of the Legion.

GREAT WORKS OF ART AND ARCHITECTURE

MASTERPIECES OF SCULPTURE

Works of Art in Stone



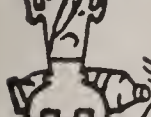
THE most wonderful things in the whole world of art, in many respects, are the poems in marble left us by the Greeks; for the Greek sculptor was a poet who expressed himself in stone just as Homer expressed himself in song. It used to be thought, not so very many years ago, that the Greeks excelled in art as they did in everything else we include under the word "culture," because they were so brilliant. It was assumed that the beautiful works which time has spared to us, such as the "Winged Victory" and the statue known as the "Venus de Milo," were fairly representative of all their work. No one thought of the Greeks as producing anything crude. But remains of earlier periods in the history of Greek sculpture show that the Greek owed his success to his patience and eagerness to learn and improve, and not to any mysterious quality of mind which would enable him to achieve such wonders off-hand. His best art developed slowly from crude beginnings.

The Greeks got their ideas of sculpture from the Egyptians through the Greek merchants of Asia Minor from whom they bought small reproductions of the native art. By comparing the head of the Egyptian king shown on this page with the best work of the Greeks, you may see not only how much Greek art advanced beyond the Egyptian, but also what excellent first lessons the Greek got from his study of the work of the Egyptian. This picture shows the head and shoulders of a full-length statue of Rameses II. He is supposed to have been the Pharaoh of the Hard Heart, of whom you have read in the story of Israel. The statue, which is carved in black granite, is in the museum at Turin in Italy and is regarded by many as the best product of Egyptian art.

Another interesting thing about it is the story of that block of stone on the Pharaoh's neck and extending down the back. The first attempts of the Egyptians to represent living forms in stone were simply outlines cut into the stone as you make a figure in sand with your finger. Next, they rounded the edges of the figures bounded by these lines. This not only made them look more natural but gave them the appearance of standing out from the stone and gave the artist the idea of cutting away entirely the stone between the figures. This, of course, made them stand out still more. Then, finally, step by step, and century after century, the idea grew so that the sculptors became bold enough to conceive the form of a figure in stone *almost* separate from a wall.

Almost, but not quite! As sculpture with the Egyptian had always been a part of a wall, it would not do (in the opinion of the conservative oriental) to make a statue—and above all, a statue of a king—without some reminder of the wall which had been a part of the images of all his ancestors. So the artists left that block on his royal back to represent the traditional wall.

It was because the Greeks, among other things, were not afraid to make changes and experiments in art that, although they got their first lessons from the Egyptians, they soon broke away from these old traditions and so achieved the perfect art represented by such works as we reproduce on the next two pages.



RUBENS



REMBRANDT



A God King of the Assyrians



THE work of the Assyrian sculptors is of interest, historically, but is not so important from an art standpoint as the work of the Egyptians. The Assyrian artist used Egyptian designs and symbols combined with those of Assyria. He got his idea of putting wings on animals from the Egyptians. He does, however, deserve credit

for the skill with which he carved the figures of animals. These huge winged bull figures are very impressive. They adorned the front of the palace of the king and were supposed to represent his god-like ancestors. The extra leg is added to the figure so that no matter from what standpoint you are looking at it, you can see four legs.

The Hermes of Praxiteles



GREEK sculptors were the greatest the world has ever seen, and among all the sculptors Phidias and Praxiteles ranked first; so that you can imagine what a wonderful event it was in the art world when excavators working at Olympia, one day came upon this statue and found that it was the work of Praxiteles. It represents Hermes—

or Mercury as the Romans called him—holding his little brother Dionysus (Roman Bacchus) on his arm. The whole statue shows a standing figure. Here we reproduce only the most striking part of it. Hermes was the most popular of all the Greek gods because, among other things, he was the ideal of youthful vigor and grace.

The Venus de Milo



THIS is probably the most famous statue in the world and is regarded as typifying Greek art at its best. It gets its name from the fact that it has so long been supposed to be a representation of Venus and that it was found on the Island of Melos. Scholars in recent years, however, have found reason to think that the statue is not Venus but Victory, and that it originally had a shield

resting on the upraised knee which the goddess held with one hand while with the other she inscribed the names of Greek heroes. According to this theory the statue was originally in the Temple of Victory in Athens, but was carried away and buried on the Island of Melos to avoid being captured by some invading enemy. The Athenians had a proverb about a Victory without wings.

Examples of Roman Art



The Statue of Augustus Caesar

THE Romans never excelled in art as did the Greeks and such art as they produced was largely the work of Greek artists or the result of Greek influence. As the Romans

worshiped force, we would naturally expect that the best work of the Romans would be shown in such figures as this of Augustus Cæsar.

The Dying Gaul



THE Dying Gaul is a very famous product of Roman art and if you should ever go to Rome you will have an excellent opportunity to compare it with the work of

the Greeks, for the original is in the Capitoline Museum near the Faun of Praxiteles, a masterpiece of one of the greatest of the Greek sculptors.

Masterpieces of Modern Sculpture

The Thinker, by Rodin



Auguste Rodin (French, 1840)

THIS is the most famous of the works of the most famous sculptor of his time, Auguste Rodin. The figure is from a door designed by the artist for the Museum of Decorative Arts in Paris, and represents primitive man, gazing at his descendants,

in Dante's *Inferno*. Rodin called Angelo his master and his idol, and you can see the strong influence of the great Italian upon the great Frenchman by comparing this figure with that of Angelo's statuesque conception of the Prophet Jeremiah, on a preceding page.

Joan Listening to the Voices, by Chapu



Henry Chapu (French, 1833)

THIS is a modern statue conceived in the simple and lofty Greek spirit which distinguished the work of Chapu; for Chapu was a deep student of Greek sculpture.

The full title is "Joan of Arc at Domremy." She is represented as kneeling, rapt, and with clasped hands as she listens to the voices calling her to her high mission.

The Stone Age



John J. Boyle (American, 1851)

BOYLE is an American sculptor of rare insight and power who has made a special study of the Indian in his most primitive state. This Indian mother has heard some sound that puts her on the defense. She has caught up one child in her arm and with her stone hatchet is preparing to do battle. Notice how the hatchet is

fastened to the handle and then remember what is said about "The Grandfather of Grandfather's Ax" in the Story of the Copper Industry. This group stands in Fairmount Park, Philadelphia. Lorado Taft, the sculptor and art critic, says that the expression of power, monumental simplicity, and unity in this work, has not been surpassed.

FAMOUS WORKS OF THE SCULPTOR

Bust of a Child, by Canfield

ONE striking difference between Greek and Christian art is that while the beauty of children and childhood is so conspicuous a feature in Christian art, it is seldom represented in Greek art at all.

With the exception of the Figure of Cupid, which frequently appeared in the work of the Greeks, you seldom find the image of a child, and when you do, both the face and the figure are apt to be too mature. If you try to draw the face of a child, you will find that it is almost sure to look like the face of an adult, so that you can see this lack of skill on the part of the Greeks was due to lack of practice



But what a sweet childish face the sculptor has given us here.

Perhaps the most famous child head in sculpture is that of Donatello's Laughing Boy. That little face is full of sunshine and you can hear the music of his merry laugh. A reproduction of it, which you can easily get in the penny picture series, would make a good comparison with this tender, serious face by Mr. Canfield. And a very delightful and profitable thing to do, in connection with your study of the beautiful language of art would be to make a collection of pictures of children and scenes of childhood as the artists have depicted them.

Birtley Canfield (American, 1866)

The Chariot Race, by Roth



F. G. Roth (American, 1872)

MY, what wild movement the artist has put into these figures! We can fairly hear the thunder of the horses' feet and feel the strain of the muscles of the charioteer. His horses are performing one of the most difficult feats in the chariot race,

that of swinging around the turning posts where the charioteer goes back upon his course.

As the Greeks learned of the Egyptians, so you can see the Greek spirit is guiding the work of our American sculptors.

The Sphinx and the Pyramids



WE ARE indebted to the Egyptians for so much in the building up of this civilization of ours! Besides making a beginning in the arts and sciences, it is they who have built the hugest monuments man has

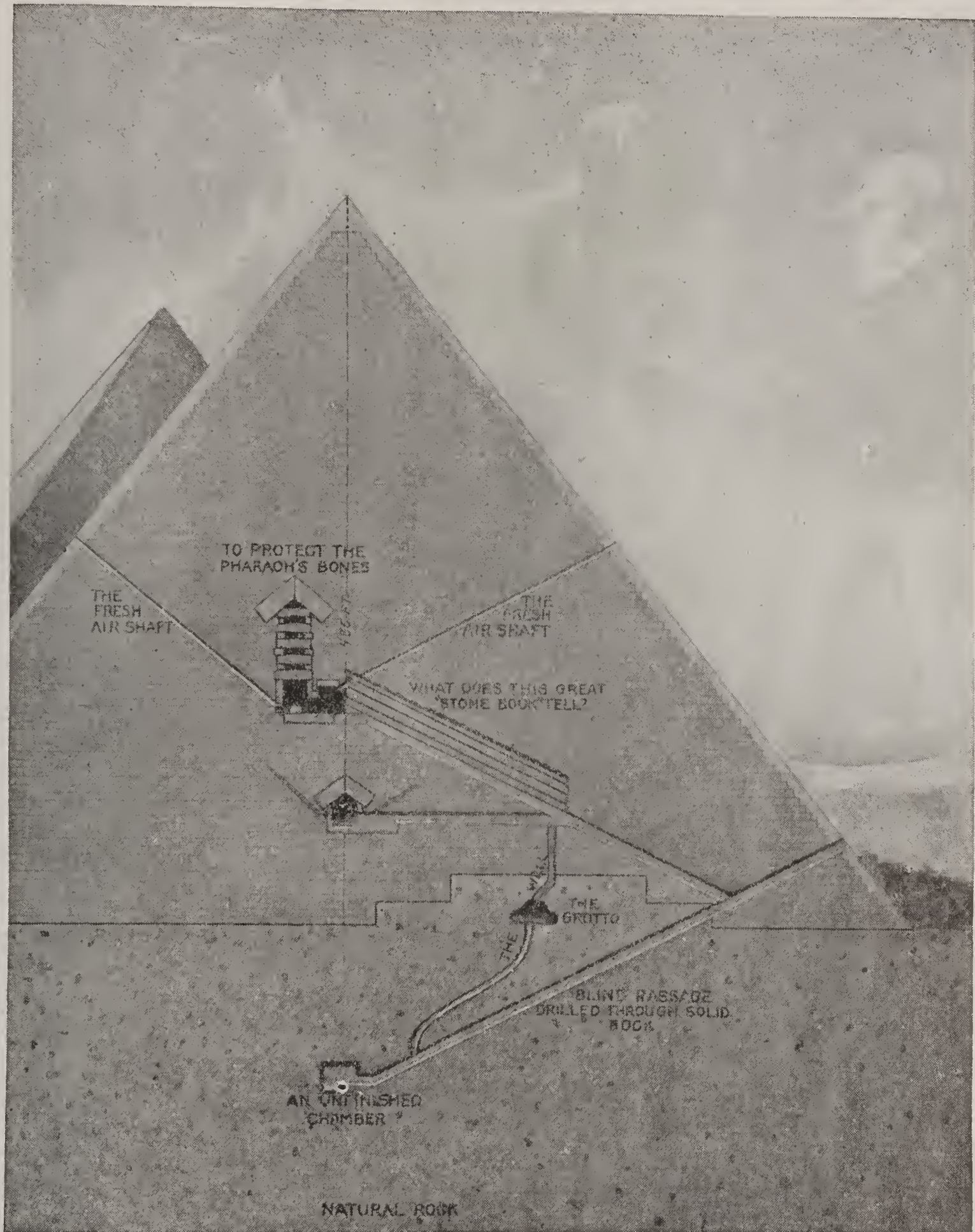
ever erected. The Sphinx and the nearby pyramids are the largest, as well as the most perfect in workmanship, of any of the structures built to mark a spot made dear to men.



THE greatest of the Egyptian pyramids is at Gizeh, not far from the Sphinx. Enormous as the Sphinx is, this picture of it with

the vastly larger pyramid in the background, makes it look quite diminutive. Most of the Sphinx' body is buried in the sand.

Inside One of the Great Pyramids



THE passages in the Great Pyramid were so cleverly hidden that it has taken seven thousand years to find them. The King's Chamber was supposed to have been built to protect the Pharaoh's bones and there was presumably a coffin within it. The ceiling, and that of the smaller room below, known as the Queen's Chamber, shows the germ of the arch. It is not a true arch because there is no keystone, but it has a

series of stone blocks braced against each other and exerting a sidewise thrust as an arch does, thus distributing the weight of the masonry above. The entrance to the King's Chamber is near the base, at the right. Before reaching it, a long inclined gallery that looks in the picture like a "stone book," had to be traversed. The object of the well and grotto hollowed out of the natural rock is not known.

One of Cleopatra's Needles



BESIDES pyramids and sphinxes, the Egyptians built obelisks like this one, for monuments—tall, tapering shafts cut from one piece of stone and covered with hieroglyphics.

This one was given to the United States by the Egyptian government and now stands in Central Park, New York.. Although built many years before the beautiful queen lived, this monument is called "Cleopatra's Needle."

The Great Washington Obelisk



THE Washington Monument, in Washington, D.C., is a modern obelisk, the largest one in the world. It is of white Maryland

marble, 55 feet square at the base and 555 feet high. It was built in Washington's honor.

The Puritan, by Augustus Saint Gaudens



Augustus Saint Gaudens (American, 1848)

THIS statue of the stern old Puritan stands in Springfield, Mass., and bears upon its base, as you see, the name "Deacon Chapin." There was a Deacon Chapin but no portrait of him exists, so that the statue is merely an expression of character. Stern and unyielding as the granite rocks on his New England coast, the Deacon with his staff in one hand and his Bible under his arm, strides forward

on his way to church. "Deacon Chapin" is regarded as the best expression of Puritanism in American art. While the Puritan was hard and uncompromising, it was his sterling character that helped much in shaping American history and laying the firm foundation of our institutions. "There was nothing in this wild land of privation and struggle to attract the vicious and weakling."

Sir Henry Vane, by MacMonnies



Frederick William MacMonnies (American, 1863)

MAC MONNIES became widely known to the general public through his colossal fountain at the Columbian Exposition. It contained twenty-seven gigantic figures, all beautifully modeled and so composed as to make the most striking effect. "Sir Henry Vane," the subject of this statue, was an English statesman who, after a wild life at Oxford, became a devout Puritan and emigrated to Massachusetts, as did the other

Puritans, on account of his religion. He became governor of the colony in 1636. As a Puritan his character offers a striking contrast to the Puritan depicted by Saint Gaudens. One of his English contemporaries, the Earl of Clarendon, spoke of him as a man of "extraordinary parts, a pleasant wit, a great understanding, and a temper not to be moved." Does he look like that kind of a man?

Grant's Tomb on Riverside Drive



THIS famous monument to one of America's great men, offers many contrasts to the pyramid monuments of the Pharaohs. For one thing it was built with money supplied by over sixty-four thousand contributors in New York, where this monument stands on the beautiful Riverside Drive, while the tomb of the Pharaohs was built by people who were virtually slaves of their rulers.

The lower portion of the Grant Monument

is of the Grecian Doric order. On this stands a circular cupola, 70 feet in diameter, of the Ionic order, surmounted by a pyramidal top as expressing the most ancient form of monuments.

The four corners of the interior, which is laid out in the form of a cross, are connected by arches and the space between the arches is decorated with figures in high relief, dealing with the military and civic career of General Grant.

The Stevenson Memorial, by Saint Gaudens



THE Stevenson Memorial by Saint Gaudens is the tribute of one great artist to another. Saint Gaudens was not a great reader, but when some friend got him to dip into "The New Arabian Nights," he says: "These stories set me aflame as have few things in literature. So when I subsequently found that Mr. Low knew Stevenson quite well, I told him that if Stevenson ever crossed to this side of the water, I should consider it an honor if he would allow me to make his portrait." It was only a few weeks after this that Stevenson came to America on his way to the Adirondacks for his health.

One of the things about Stevenson which appealed to the artist was the beauty of his long slender fingers. The fingers of Mrs. Saint Gaudens were long and slender, like those of Stevenson, and the artist tried to use them for a model but was not satisfied with the result. So he made a cast in clay from Stevenson's own hand. This will give you an idea of how carefully artists work to get their results and what trouble they often have, just as you do when you are trying to make a picture of something or to model it in clay.

When Stevenson posed, the position was at first forced and unnatural, so Saint

Gaudens suggested that if he would try to write he would probably fall into a more natural attitude. He took up a sheet of paper, of which he always had a plentiful supply around his bed, pulled up his knees and began. The result was the position you see, which is exactly what the artist wanted. When Saint Gaudens had finished, he told Stevenson he need not write any more, but Stevenson kept on. When he had finished he folded the paper on which he was writing, put it in an envelope, addressed it, and handed it to the artist. On the back of it was the inscription, "To Master Homer Saint Gaudens." The artist's son, who was then a little boy, had been introduced to the famous author by his father, and Stevenson in the kindly impulsive way which was one of his most delightful characteristics, wrote the boy quite a long letter in which he said many nice things about him. The letter, in accordance with Stevenson's directions, was given to the boy years later. You may imagine how he treasures it.

This memorial of a heroic and beautiful life is singularly appropriate because Stevenson was an invalid and did a great deal of his work in bed, as he is represented as doing here.

The Meaning of Art and Architecture

I THINK we all realize now, and better than ever before, when so many of the great masterpieces of architecture have been destroyed almost in our sight, how much more they stand for than the excellence of individuals or peoples in this very wonderful form of art. You cannot think of Rheims Cathedral or the Cloth House at Ypres or the Town Hall of Arras as nothing more than the masterpieces of great artists or as the curious and interesting records of almost forgotten times. They are far more than this, and so are all the other great buildings that time and man have spared from amongst the myriads that once made towns and cities such beautiful places to live in; they are records indeed, but records of the best that was in any community; the best in thought, in aspiration, in honest and joyful labor.

Man is the animal that tries and he is always striving for something better—or at best this is so most of the time and while he is living as he was intended to live when he was created. Also, he is always impelled to express this “best” through beauty in one or many of its varied forms, for the sense of beauty was given us just that we might say through it, symbolically, those things that are so very high and fine that they cannot be expressed in words. The saying of those high things beautifully is what we mean by Art.

Now, ever since the beginning of history, the high and fine things have always meant a definite and sincere religion, and so all the greatest art of the world has been closely connected with worship. It does not matter whether you consider architecture, sculpture, painting, music or any other of the arts—all have come in the beginning from the religious sense and the healthy hunger for worship. You realize this in architecture through the fact that practically all the examples that remain to us are either temples or churches, until you come down to comparatively modern times.

Now this is not only significant of what art means and of what it must have again if it is ever to reach once more the level of the great art of the past, but it also shows us what we can learn from the old architecture if we look at it in the right way. In these wonderful buildings, whether they are Greek, Roman, Byzantine, Gothic, Renaissance or even Asiatic, we can see the best of the several peoples expressing itself through the master builders, craftsmen, and artisans who are only the mouthpieces of the communities of which they are a part.

Architecture—and this is true of all the arts—is a great and very reliable teacher of history, for it reveals, not more or less accidental events, but the best in the peoples that made it.

Ralph Adams Cram

Story of the Builders

How Huts and Caves Grew into Cathedrals, Palaces, and Homes



St. Peter's and the Eskimo Hut

"The snow hut of the Eskimo is a rude burrow. But in form it is the same as the lifted domes of St. Peter's in Rome and St. Paul's in London."

NEARLY everybody thinks he knows just what he would do if he were a castaway like Robinson Crusoe. Trust him for finding food, starting a fire and building a good shelter! But just *how* he would do these things would depend upon where he found himself. What materials and tools he had, and how well he could use them.

Did you ever think that a man who was cut off from other

men, and from all that people have learned to make and use, would be like the tree and cave-dwellers of thousands of years ago? He would have to conquer nature all over again in order to provide for his simplest wants. At first he would have to eat his food raw, and sleep in a cave or a tree-hammock. He could make a tent of poles and the skins of wild animals—but he would first have to catch the animals. In a tropical land he would find long grasses, bamboos and palm



leaves for building a tent, but he would need a tool for cutting them. In a forest there would be poles and bark; in a rocky land, field stones, mud and moss; on semi-desert plains, clay for brick making; in Eskimo land animal bones and snow.

Did You Know There Are Cave Men Today?

Caves and tents and huts were the earliest homes made by men, and people are still living in just such shelters. None of them were easy to make. The cave-dwellers had only sticks to dig with, or clumsy stone and bronze tools, and clay vessels for carrying out the earth. Yet they dug whole villages of caves — these cave-dwellers. They scooped rooms out of the stiffest clay, between ledges of rock, one street of cells above another, high up on the faces of the cliffs. They had to do this to be safe from enemies and from wild animals.

The mound builders of the Mississippi Valley dug pits and roofed them over with sod. Then they heaped up earth walls around villages. They lived in earthwork forts. Armies throw up such ridges today. Soldiers and campers copy, in canvas, the skin-covered tepee of the Indian, and circuses the tent house of the herder on the Arabian desert. The Gypsy has put his tent on wheels. People who had to move about to hunt and fish, or to find pasture for animals, used the tent. It could be taken to pieces and carried from place to place.

Where people could live safely, and find enough to eat without moving about, they built huts, improving on their old caves and tents. Men improve, and borrow and imitate, but they do not invent something entirely

new. In any art or science they take one step at a time, although, when they travel and see other ways of doing things, they take longer steps at a time.

The cave-dweller learned to use a hearth stone, under cover, and to cut a smoke hole. Used to working in clay, when he came out of his cave, the Pueblo or village Indian made his hut of sun-dried bricks. A tribe put all their huts together in one cliff-like building. Perhaps they still needed a fortress. But wise men think they didn't know any other way to build.

*The First
Brick
Makers*

The Man Who Lived in the Tree

In tropical countries tree-dwellers made hammocks of vine stems woven with grasses. Very likely they sat under these for protection from the sun. Then they raised canopies on poles. It was only one step more to weave walls. The roof was thatched with leaves to shed rain. The grass huts that are still made in many tropical countries are very clever samples of basket work. Stiff ribs are set firmly in the ground in a circle, drawn together at the top and woven with tough grasses. Every island in the West Indies, in the South Pacific, and every district in tropical Africa, had its own way of building. The most abundant materials were used, in the easiest ways at first, then in the best ways. Some of these grass huts are well built, and last for years.

Even the Eskimo improved his snow cave. Uprooted trees in far away, warmer countries, fell into rivers, were carried out to the ocean and drifted to Arctic shores. The Eskimo did not know what trees were but he used these trunks, and later, timbers from wrecked ships, as

*People Who
Live in
Grass Houses*

*How
Men
Invent*

*Improving
the
Snow Hut*

The Cliff-Dwellers in Their Homes

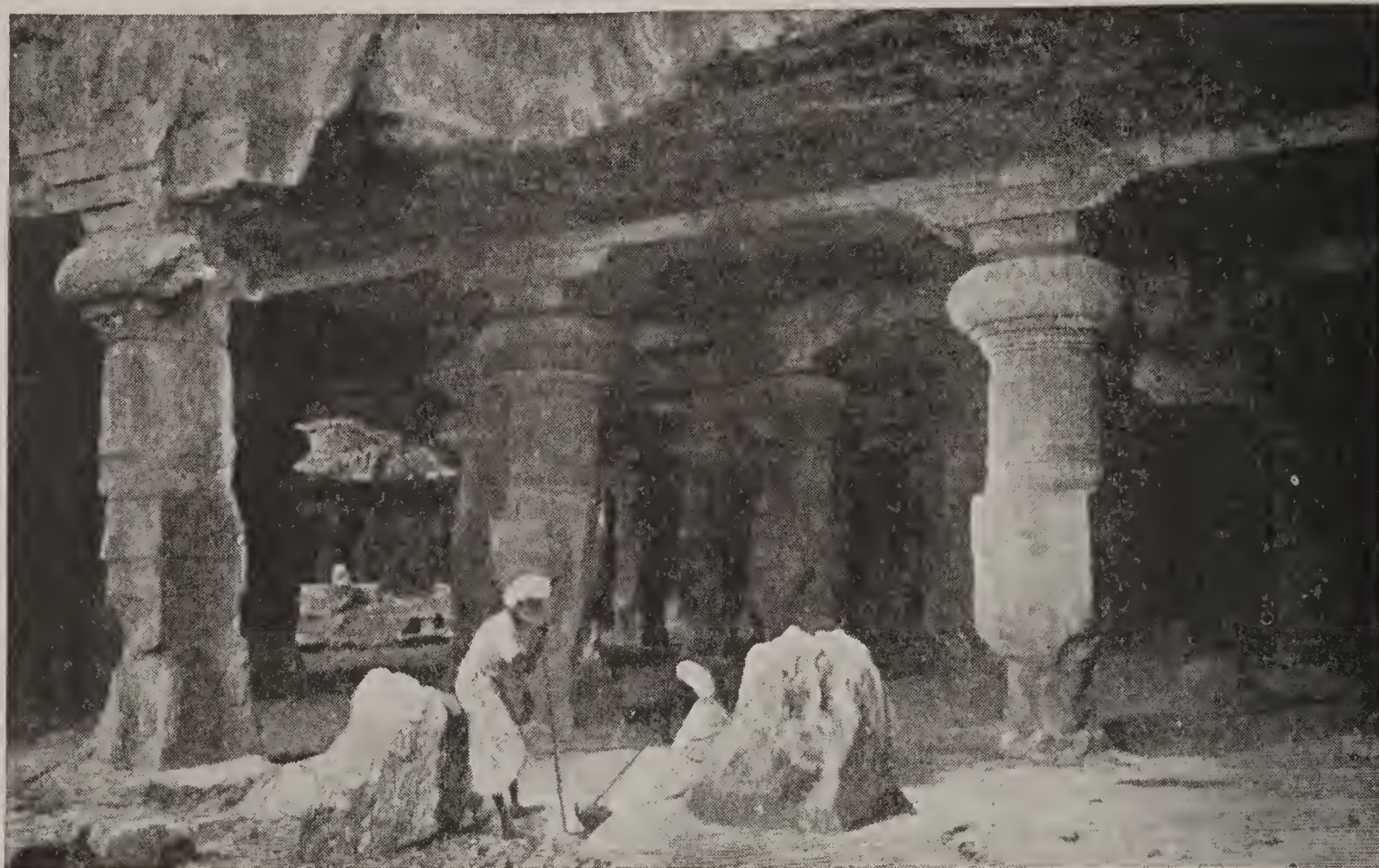


The cliff houses, of which there are extensive remains in many of the western states, must have looked like this in the days when their Indian builders lived in them. The immense rock chambers for the storage of food, which they contain, and the difficulty of getting into them, must have made them a very sure protection against enemies, because the whole tribe could remain for weeks in this stronghold which would be very hard to capture, indeed.

a framework for his snow hut. In time, if he can get enough timbers for building, he may not use snow at all, except as a winter blanket. He has got tools and guns and sledges, clothing and furniture from

house but he had a good ax, a saw, an auger, a hammer and other tools. If he was of English family he built his houses of logs laid horizontally, notched and crossed at the corners. A French pioneer in Canada, and

A Very Old Underground Temple



The early Christians in Rome built underground churches or catacombs, because the persecution of the government made it necessary for them to hold their services in secret. But ages before Christianity came into the world, people had formed the habit of worshiping underground. The reason for this is that the earliest forms of religion were connected with the burial of the dead, and worship was carried on in the place where the tombs were. The picture shows the ruins of a beautiful and richly decorated temple on the island of Elephanta, near Bombay.

Arctic explorers, and he lives much more comfortably than he did a hundred years ago.

The Two-Legged "Bees" of Northern Europe

In Northern Europe men made bee-hive shaped huts of field stones chinked with moss. Some used poles and branches woven with willow-twigs, plastered with clay and thatched with grasses. No doubt they learned to use bark. The Iroquois Indians made long bark houses. Timber houses could not be made until there were stone and bronze axes. The American pioneer made a log

*French and
English
Log Houses*

along the Mississippi made a post house. He set his tree trunks upright in a trench. But both of them chinked the cracks with clay and moss until they could burn lime and make mortar. The block-house fort was made with logs laid horizontally; but the enclosing wall was a stockade of posts.

The People Who Lived in Lakes

The settler in America did not invent these ways of building. Not so many hundreds of years before, in the wooded countries of western Europe, people had built huts and defensive walls of timber. In Scotland

*How Lake
Houses
Were Built*

and in Switzerland, in the ages of stone and bronze tools, wild tribes built tree-trunk villages in shallow lakes, to be safe from enemies or from animals. Piles were cut and driven in the mud, or they were mortised in beds of logs, or braced

Nuremburg, Germany, in Edinburgh, Scotland, in Swiss mountain hamlets, and in English villages, you can find beautiful specimens of timbered houses made centuries ago. When the forests became thin they had to use

*Beautiful
Timber
Homes*

An African Village



"Every district in tropical Africa had its own way of building. The most abundant materials were used in the easiest ways at first, then in the best ways." The natives who built these huts have learned to build the walls of mud and stones, though they still make roofs of grass and leaves.

with stones to form piers. On top of these piles platforms were laid and timber houses built. A bridge was built to the shore, or dugout boats were used. Sometimes people were driven out of their lake dwellings by rising waters. But certainly they came to dry land to live as soon as they could.

How do you suppose they built homes then? Why, with timbers. They were timber workers, and all over western Europe today — in

timbers only for the framework, and to fill in panels with brick and stone, which they usually plastered. We copy this half-timbered, stucco house today.

Why Solomon Sent to Tyre

In every country men worked best in native materials. In one place the carpenter was the best workman, in another the brick-maker and layer; in another the stone-cutter. When the Israelites were slaves in Egypt

How London Probably Looked



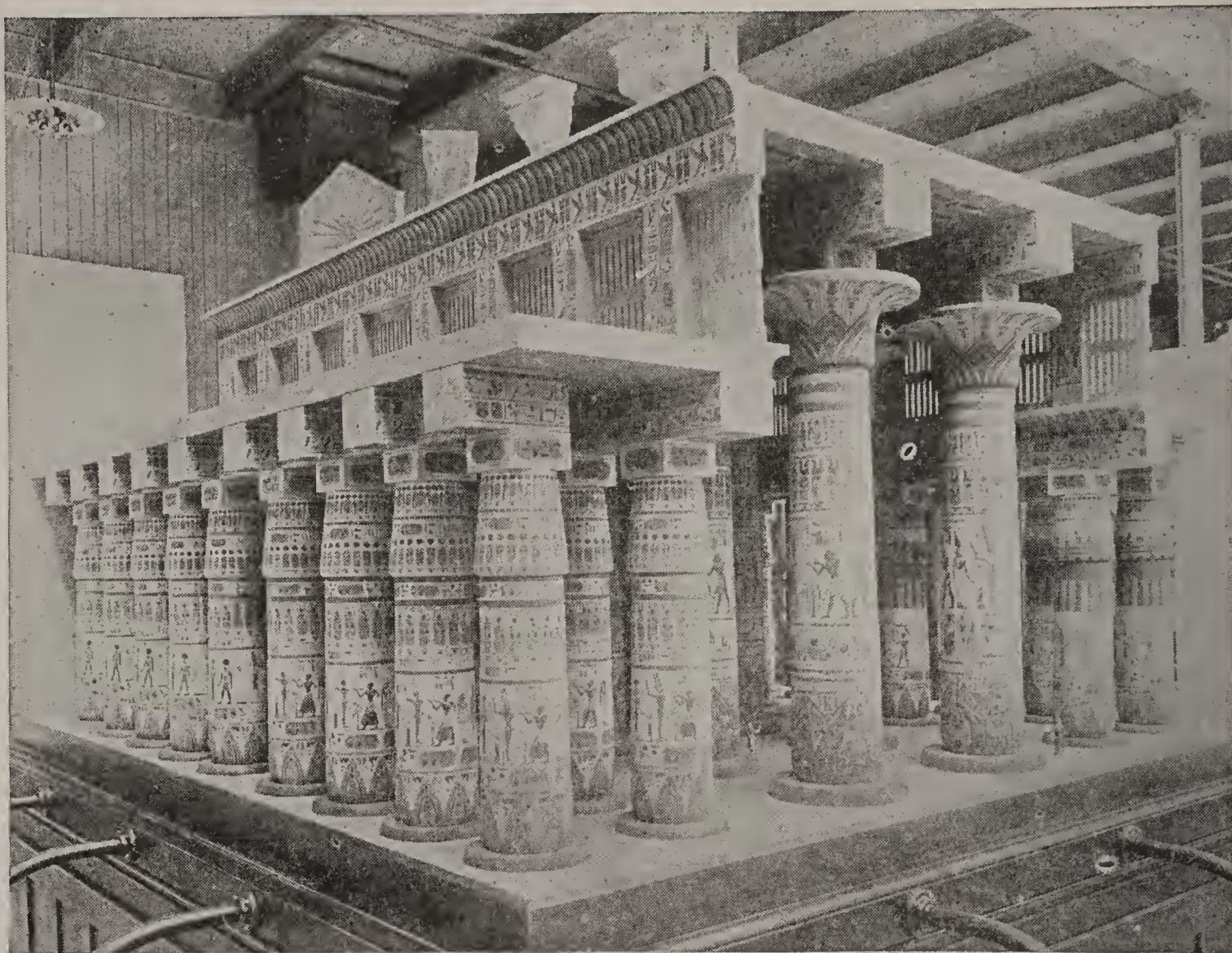
Isn't it strange that this prehistoric village, the remains of which were found near Glastonbury, England, this ancient village, you would see the docks as the heart of the city and the water traffic as the basis of its commerce. On the extreme left you see the beginning of the ship-building and ship-repair yards of the England of the Stone Age. In the center is a slave putting clay in baskets ready to carry into the village, where it will be made into the crude pottery utensils of a hunting expedition. The men on the left have brought in swans which were then used for food. The hunters are known to have used slings, because thousands of "sling-stones" made of clay balls have been unearthed.

n the Days of the Ancient Britons



much like the great London of today? Looking at a bird's-eye view of London today and comparing it with life. London was in fact probably such a village as this at the time when the ancestors of the English lived in y. These men are digging out a boat. On the right of these are fishermen hauling in their nets. Near them in housekeeping of that day. In the center is the chief accompanied by two attendants welcoming the return armed with iron-headed and stone-headed spears. They are supposed also to have used bows and arrows. They

How the Egyptian Temples Looked



This is a model or pattern of an Egyptian Temple. The Egyptians, you know, were the first to build really beautiful buildings. They used the column, as you see. In fact, their temples were composed almost entirely of columns. Can you tell how these columns are different from those built by the Greeks? Notice how small the human figures look beside them. The comparison gives you an idea of what tremendous pieces of architecture these temples were.

they learned to make bricks. Long after they were free they had not learned to shape timbers and fit them together. When King Solomon built his temple he had to send to Tyre, a ship-building city, for woodworkers.

Egypt, a desert country, burned brick, and dressed stone. Greece worked first in wood, then in marble.

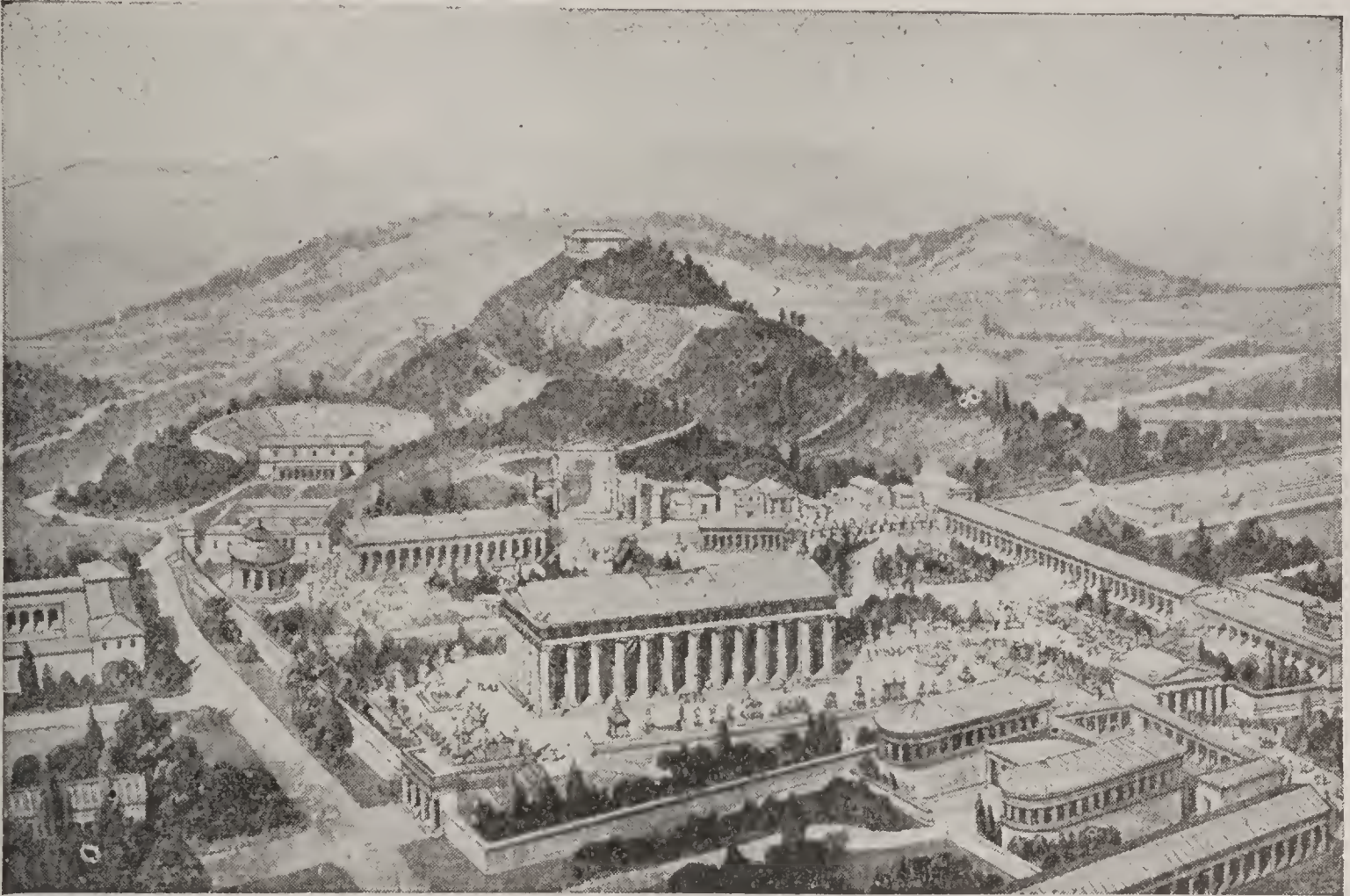
Many Kinds of Building Material Rome used brick, stone and cement. Marble, which had to be brought from Greece, was used in thin sheets as a veneer. Arabia made sun-dried bricks. China, having many kinds of fine clays, made bricks, tile and porcelains. In Iceland, Lapland and other cold, treeless countries, people

have never been able to make anything better than low, cave-like huts of mud and moss and sod.

"Tents" Fifty Stories High!

Our houses of today are just improved caves, tents and huts. You can find the tent form in pictures of the little houses in the islands of the East Indies. They were built by Chinamen. All over China, Japan, Korea, and Siam you will find the tent roof. It has curly edges, pushed up corners, sagging sides, as if it were a skin canopy held up by poles. At one time most of the people of the Far East were herders on the wild steppes of Central Asia. Even today the Chinese build the roof of

The Playground of the Ancient Greeks



Olympia, the ancient Greek city where the Olympic games were held, must have looked like this. All the buildings illustrate the Greek type of architecture—a sloping roof supported by rows of stately, graceful columns. The large building in the center is the temple of Zeus, which contained the huge statue of Zeus that was one of the seven wonders of the world. (Read the story about it.) The long building at the extreme right is the entrance to the stadium where the races and other athletic contests were held.

a house first, on scaffolding. Then they run the walls up to the roof.

Putting the Roof on First The Japanese, too, build heavy roofs of tiles on corner piers, but their walls are thin, as if merely the curtains of a tent. The most beautiful oriental palaces, temples and pagodas, of glazed bricks and tiles and painted porcelains, have this tent-like form.

The First Great Step

The houses of Europe and America grew from the hut, and it was a big step when the hut was squared. A square hut has corner posts, cross beams, a ridge pole and eaves. Very slowly the square hut became a comfortable house. A floor of rush mats, of split-bamboos, of split-logs

or of flat stones was laid; a doorway was cut and fitted with a door; a window opening was covered with lattice, beaten skin, thin sheets of pearl shell, or with glass.

In cold countries a bleak hut was turned into a warm cabin by a chimney so built that a fire on the hearth warmed the room and cooked food while the smoke went out of doors.

In America, although it was a wild country, we did not have to wait until we could re-discover how to dress timbers, burn brick and lime, cut stone and make nails and glass before we could copy the houses of the old world. Workmen skilled in the trades came over in the Mayflower, bringing their tools, and ships went back and forth. Our fur and wheat, tobacco and cotton were traded for manufac-

Foreign Houses on Our Streets

Where Santa Claus Comes Down

Building a Pioneer's House

tured goods. We soon copied the Dutch house of brick; the English cottage of timber and plaster; the church with its spire or tower, and its pointed windows; the pillared portico of the Greeks, in our public buildings and mansions.

No people in the world ever had such a chance to build well, in all materials, and

in any way we pleased, as we. That seems to have been just the trouble. We had too much of everything, and we were growing fast, spreading over a wide country and were in a hurry. A man lived in Boston, his son in Cincinnati, his grandson in San Francisco. Anyone was likely to move the year after next.



In the days when this big country of ours was a vast wilderness with no factories or railroads or cities, settlers built log cabins with dirt floors. At the top a pioneer boy is tamping the ground with a heavy post to make one of these floors. It will be as firm and hard as cement. He is glad to have a share in the building of the new home. See how happy he looks. In the lower picture two boys are helping their father pile log on log for the walls of the cabin. Notice how they are raising the log to its place by rolling it up the incline made by two smaller logs.



And oh, we were "terribly" clever. (It's not good to be too clever.) The sawmill cut up our trees into clapboards and shingles. The paint brush covered cheap and

before. Perhaps we shall. Perhaps you may help do it.

For one thing railroad and steamship lines now bind all the peoples of the earth together with links of

A Puritan Dwelling in Salem, Massachusetts



It is in New England that we find the greatest number of this kind of houses. Prim, without ornament or decoration, a little stern—they express the characters of the uncompromising Puritans who first built them. Compare this one, known as the Orne-Ropes house, with Mount Vernon. The doorway with its meager porch has a different aspect from that of the hospitable, pillared verandas of the colonial style.

hasty work, the scroll saw was made to do the slow work of the stone cutter's chisel. Clapboard palaces were trimmed with wooden lace. Yes, it was just as bad as that! The best thing about such houses was that they wore out quickly.

Then the forests began to disappear. It's an ill wind that blows no good. We were obliged to build better, in brick, stone, tiles, stucco, cement and steel. No people ever built their best until they began to work in lasting materials. It did not seem worth while. There are several reasons why we ought to build better than any people ever built

trade and travel. You know what Puck says, in *The Midsummer Night's Dream*: "I will put a belt about the earth in forty minutes." The cable and wireless telegraph is doing that. We can have anything movable brought to us so easily. If we stay at home we can travel, in books and pictures and museums.

Gothic and Greek Styles in Architecture

Trade and travel always give people new ideas. People always try to imitate anything new that they admire. But no one can copy anyone else exactly. It is himself he puts into everything he makes. The

*Cheap Houses
that Didn't
Wear*

*Where These
Types
Are Seen*

A Poem in Marble and Fresco



©Keystone View Co.

This is a view of the Congressional Library at Washington. The architecture here is another blend of many styles. The capitals are Greek (Can you tell which of the three great Greek styles they are?) and the arches, balconies and vaulted ceilings are typical of later periods. Some one has called it "a poem in marble and frescoed walls."

western world likes the Greek and the Gothic styles of building. The Greek style has a flat or slightly sloped roof, straight lines and columns. The Gothic is marked by its round or pointed arches. It runs up to towers, domes and spires and blossoms with dormers, chimneys and gables. Both styles are beautiful and may be carried out in great variety. We use the Gothic style chiefly for churches, the Greek for

business and public buildings and for homes. The Italian villa omits the pillars. The Southern mansion, known as the Colonial style, is modeled on the Greek temple. We are now building a good many Italian-Greek houses in tile and stucco, but the Colonial house is more truly American.

"On the Front Porch"

We have a changeable climate—hot summers and cold winters. We

Mount Vernon on the Potomac



Washington's home, Mount Vernon, was one of the earliest and best examples of colonial architecture which we now honor as the most truly American style.

need a porch for a sun parlor and rain shelter. The Puritans built a porch across the entrance door, the Dutch a "stoop" or roofed steps. In

Different Kinds of Front Porches the French Colonial house the roof sloped out over an open gallery. But it was in Virginia that the white pillars were run up to the roof. Trees were plentiful so the planters used them, as the Greeks once used them, to support the roofs of their open-air temples. But we rounded and fluted our tree trunks, spread the bases, carved the leaf capitals and painted the columns white in imitation of later Greek marbles. Still, the Colonial house was a home, not a temple. It expressed the spirit of the man who lived in it. It is the kind of home in which we like to think that Washington, Jefferson, Jackson and Lee lived. The White House is in this style. It is a President's mansion, not a King's palace. So now the

Colonial has become a historic, American style. And the longer we live in it the more at home we feel in it.

Busy Men Who Live in Steel Bridges

Another American building is the skyscraper. In a way it is not an invention. We simply set an iron or steel bridge on end, and close the sides with brick or stone. In form it is the old cliff-dwelling, one row of cells above another. The earliest ones had no style. They were simply packing cases with holes cut in them for windows. But, even so, they expressed the American spirit. They expressed our energy, self-confidence and ambition; our ability to conquer difficulties of every toil. The first skyscrapers were ugly because we did not realize that they could be anything but useful. Now we understand that they are really towers and, of course, beautiful

A Skyscraper's Skeleton

towers have been built. It was a Chicago architect who said, when he designed the Woman's Temple: "I will lead the eye up to a roof that will go singing to the stars."

Now a Greek building should be low. It should keep the eye on a restful level. A Gothic building leads the eye upward. The most beautiful bell tower in the world is Giotto's, or the Shepherd Tower in Florence, Italy, and that is Gothic.



"In a way the skyscraper is not an invention. We simply set an iron or steel bridge on end and close the sides with brick or stone. In form it is the old cliff-dwelling, one row of cells above another—simply a packing case with holes cut in it for windows."

Here is a hint

Ruskin says there are just two kinds of buildings—those that do and

Eskimo is a rude burrow, the Kaffir's hut an overturned basket. In neither of them could a man stand erect, or look up to anything above himself. But in form they are the same as the lifted domes of St. Peter's in Rome and St. Paul's in London. And those are arches springing to the sky and turning the thoughts of men up to heaven.

Buildings that Do and Buildings that Tell

A New York Skyline



A view of a modern city looks very different from that of Olympia, the city of the ancient Greeks, doesn't it? The Greek buildings with their column walls, would not be suitable in our climate and they would take up too much space in a crowded American city. The modern tall building better suits our needs, and furthermore, we are learning to build skyscrapers that are beautiful as well as useful.

for builders of skyscrapers. Which of you is going to build skyscrapers when you grow up?

St. Peter's, St. Paul's and the Eskimo Hut

You see, there is more in a building than the materials and workmanship and form. The snow hut of the

those that tell. A warehouse is good if it protects from the weather. But

What a Cathedral Says

a cathedral should tell, in height, and strength and grace, in painted wall and golden dome and stone tracery, all that men have dreamed and striven,

A City Apartment House



The apartment house is a space-saving device—a row of residences, the rows being perpendicular instead of horizontal. We have copied this, also, from the cliff-dwellers. The picture shows a fine, new, eleven-storied apartment house in New York City.

The Entrance to the Apartments



Money and skill are not spared in producing the desired artistic effect in modern apartment buildings. Like the skyscraper, they are a development of modern civilization and have brought into being a new style of architecture.

The New Architecture



The picture shows a good example of a modern American home. It is a composite of many past styles of architecture, softened and blended so that they make a harmonious whole. Here are the different elements to be seen in it: Spanish Moorsque, Algerian Moorsque, California Mission, East Indian, Chinese ornament, modern invention and Anglo-Saxon home atmosphere.

that was good and beautiful and true.
A home should both do and tell. It
What a should be comfortable to
Home live in, but it should also
Should Say express the spirit of the
people who live in it. One should
find in it what one finds in a poem

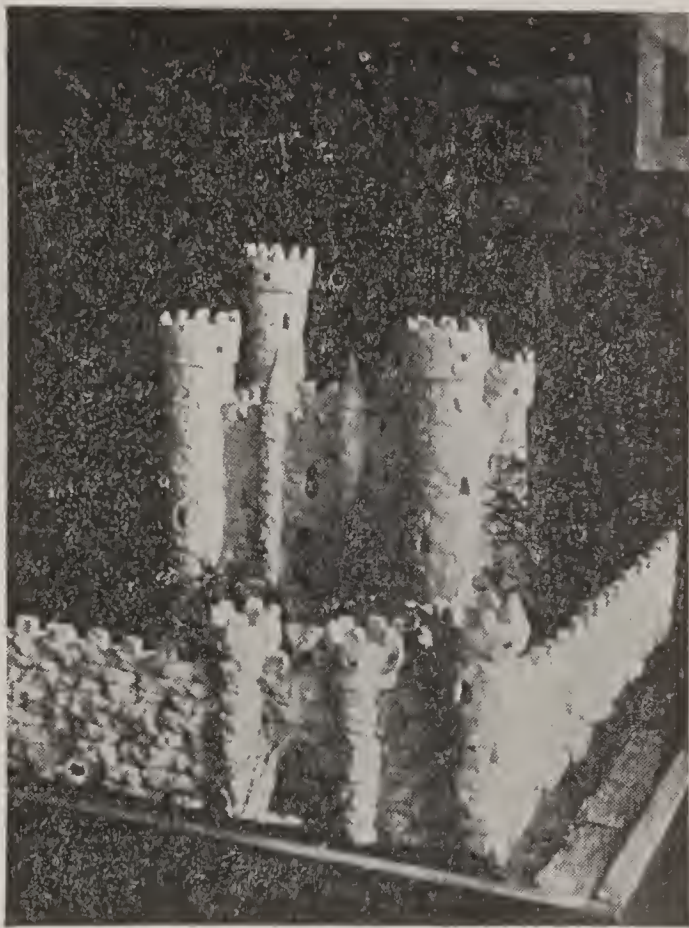
that speaks to the heart, a painting,
a statue, a song. Each man's chim-
ney should be as Longfellow says: "A
Golden Milestone from which he
measures every distance," not only
outward into the world, but upward
in all the ways of sweet living.

The Work of the Little Builders

THIS is a castle of the Middle Ages. It was built by third grade children in Franklin, Indiana, in connection with their history work. You can see that it not only taught them a great deal about architecture, but made History seem very real.

In one corner of a sand table, stones were piled to form a hill upon which to build the castle. A board, 15 x 17 inches formed the foundation. With a compass four circles, each three inches in diameter were drawn, one in each corner of the board to outline the towers. These were connected with two parallel lines one inch apart, for the castle walls.

The clay, which had been soaked in warm water over night, was kneaded by the pupils until all lumps were removed, and it was of the consistency of dough. Then began the real work of building. The children worked at a bench rolling the clay out like biscuit dough, leaving it about one inch thick. Then with a knife they cut this sheet of clay into strips one inch wide and of the desired length. These strips were then placed on the board following the outline. It was built layer by layer,



The Medieval Castle, Constructed by the Children in Franklin, Indiana

pressing each together firmly with the hands. A strip of pasteboard one inch wide was used as an arch foundation for the doorway. The smaller towers on either side of the doorway were built of solid pieces of clay.

When the walls were nine inches high a piece of stiff paper was laid over the top to form a roof, and then three inches more was added to this height, forming the battlement. The towers

were built of different heights. When completed the clay was marked off with a sharp stick to resemble stone.

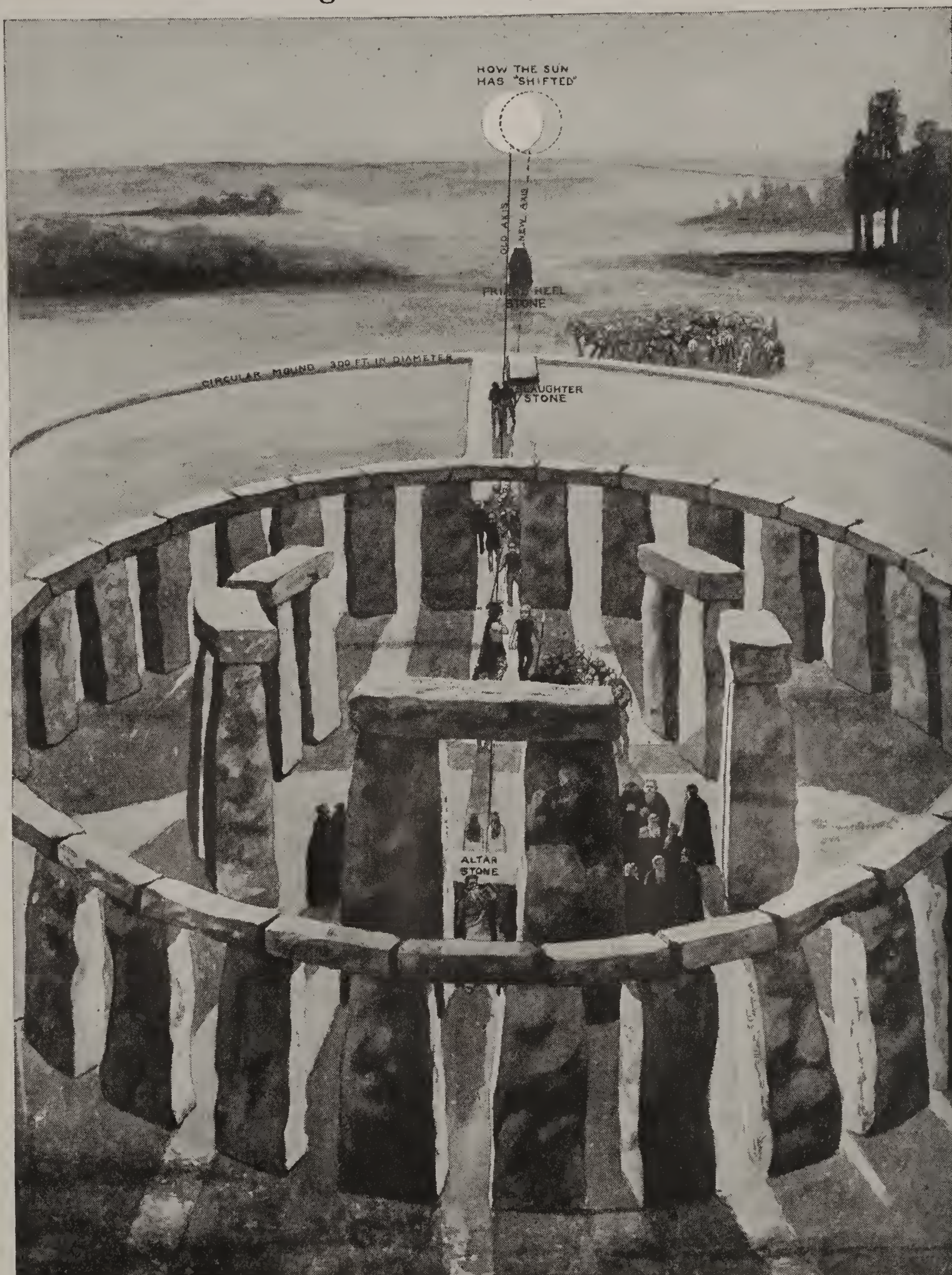
After the castle had stood a day or two and the clay had dried out somewhat, the windows were cut with a knife. The gratings in the windows and doors were made with window slats.

The wall around the castle was made of clay blocks. It is six inches high with a battlement at the top.

A moat was made around the wall by digging a trench in the sand, and placing tin foil at the bottom with a glass over it to resemble water.

A wooden drawbridge was suspended by a chain to be let down across the moat.

Stonehenge in the Days of the Druids



There are several theories explaining the ruins at Stonehenge, but the most generally accepted one is that they are the remains of a temple built for sun worship. These ruins are a fine example of primitive architecture, built entirely on the lintel principle—that is, a series of columns capped by crosspieces. When the temple at Stonehenge was built, the midsummer sun rose on a direct line with the center of the horseshoe, the slaughter stone and the friar's heel stone. But because the earth's axis is constantly shifting a little, the sun now rises a few degrees to the right of this line. By calculating the angle the sun's rays now make with the line in which the three stones used to lie, and by figuring the rate at which the earth changes its axis, astronomers can tell us when this old temple was built—about 1680 B. C.



Great Works of Architecture



Stonehenge as It Looks Today

THE story of the Builders tells how men first built their homes. When a chief died, the tribe wanted to mark his grave in some distinctive way, to pay him a last tribute of homage and respect. From the earliest times we find the burial of the dead associated with religion. So our savage forefathers built monuments to their dead which were also temples for the worship of their gods. In the beginning these structures were nothing but heaps of stones. Later there were some crude attempts to shape the stones and they were piled upon each other in a more orderly fashion.

Like Giant Fingers

The Stonehenge temple originally consisted of a circle 100 feet in diameter, made up of thirty lintel-capped stones. Inside this, five trilithons—archways made up of two upright stones and a crosspiece, three stones in all—were arranged in the form of a horseshoe. These stones were all carefully fitted by means of mortise and tenon joints. (You can learn how these joints are made from the article on Manual Training.) It is thought that the trilithons were symbolic of the position of the five fingers in taking an oath, for the early Britons always took an oath by raising the hand with the fingers close together. The middle finger, longer than the rest, is represented by the central trilithon, 22 feet 6 inches high; the next one on the left corresponding to the ring finger was 22 feet, and the one on the right—the index finger—was 18 feet. The two end trilithons were each 16 feet high. It is thought that the sacrifice was prepared on the slaughter stone outside the circle and offered up on the altar stone.

The ruins at Stonehenge, England, show that the early Britons had reached this stage.

As they had no strong, sharp cutting instruments, they could only hew big blocks of stone roughly into the shapes they wanted. They stood these blocks on end and set other blocks across the top, making rows of rude pillars. But in doing this they had learned the

first principle of architecture, that of the *lintel*. A lintel is a crosspiece or beam resting on upright supports. It was not until man had traveled for many centuries up the steep, hard road of civilization that he learned to build in any other way.

The Temple at Karnak

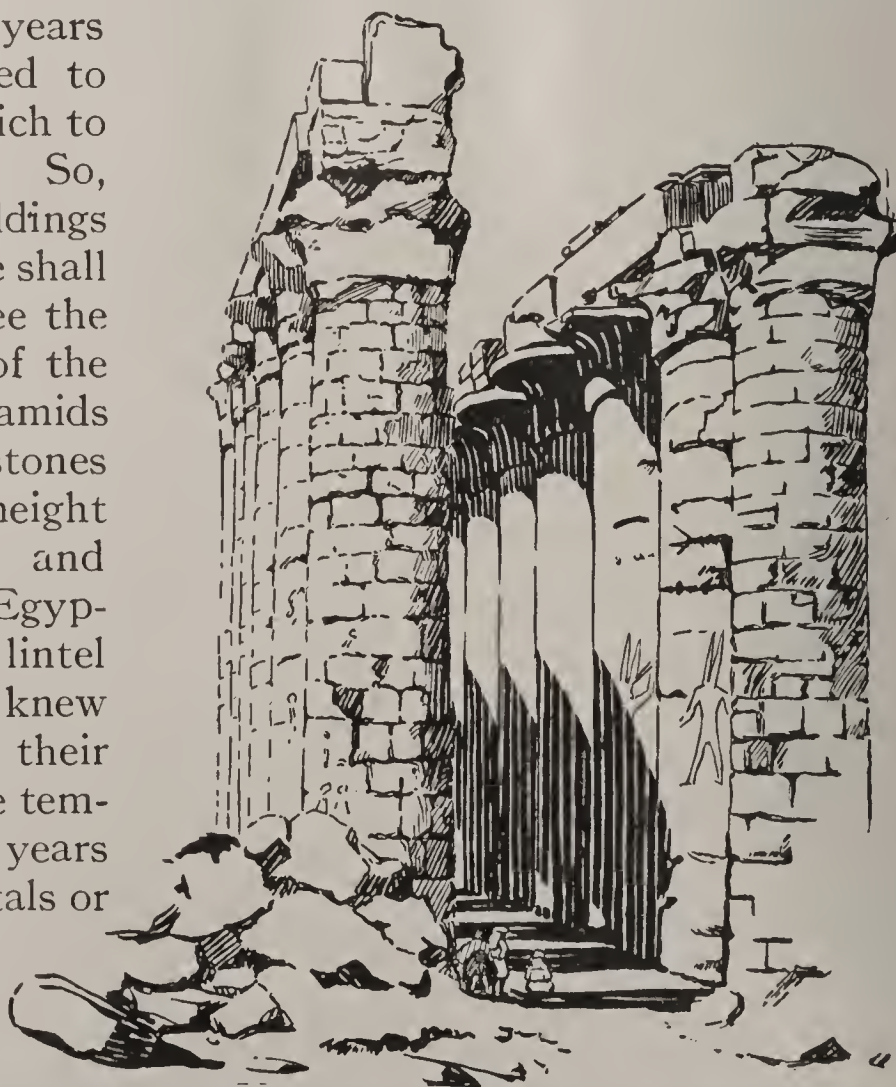


The Egyptians were the first great builders. They made huge columns such as these, with lotus-bud capitals. The drawing below shows another style of Egyptian capital, shaped like an open lotus flower.

What We Owe to the Egyptians

The Egyptians are a very old people, and thousands of years before the Britons they learned to make beautiful structures in which to worship and bury their dead. So, in order to understand the buildings in this modern world of ours, we shall have to journey to Egypt to see the great pyramids and the ruins of the Egyptian temples. These pyramids are the primitive man's pile of stones heaped up to an enormous height and planned with much care and knowledge of geometry. The Egyptian temples were built on the lintel principle, but the Egyptians knew how to round and carve their supports to form columns. The temple at Karnak was begun 2,000 years before Christ. Notice the capitals or crowns of the columns. Don't they remind you of a flower bud? They are carved stone

copies of the lotus flowers that grow in the Nile valley. Later the Egyp-



Another Kind of Pillar



The great pillars at Karnak are a little too heavy and massive to be graceful. Compare them with these supports of the porch of the Erechtheum on the Acropolis at Athens—slender girls, strong enough to bear the heavy weight of the roof, yet gracefully poised. They are typically Greek figures, stately, strong, well-arranged draperies falling in graceful folds.

tians finished their columns with full-blown lotus flower capitals—an upturned, bell-shaped design. Study these long rows of massive columns. They are too solid and heavy to be graceful, but how stately and proud they look! The Egyptians, like all Orientals, considered impassive repose the highest attribute of deity and this, you see, they expressed in these haughty, impassive pillars. The largest were 70 feet high and nearly 12 feet in diameter.

Then Came the Wonderful Greeks

Partly borrowing from the Egyptians and partly working out their own ideas, the Greeks were the next people to add to the world's knowledge of how to build. They were an industrious, quick-witted people, artistic to their finger-tips. They lived on a little peninsula in the Mediterranean with many island stepping-stones to Egypt and the East. And

because the Greeks did a good deal of visiting and trading with their neighbors, they soon learned all that those older countries could teach them

The Lion Gate



This is the lion gate at Mycenæ. It shows the first step in the development of the keystone arch.

How the Parthenon Looks Today



The Parthenon, as you know, was built long ago as a temple to Athena. Later it was used by the Christians as a church. In the fifteenth century, when Greece was conquered by the Turks, it became a Turkish mosque. At one time the Turks had some powder stored there which exploded, making the building the ruin you see in the picture. Lord Elgin, an Englishman, gained permission to collect as many of the beautiful sculptures as he could, and they are now to be seen in the British Museum, where they are called the Elgin Marbles. Could you tell that the lines of the building really slant though they look straight?

and set about adding to and improving what they had learned. Then, too, they had a lovely land of blue sky, forested mountains and sparkling rivers to inspire them to beautiful thoughts; and they had quantities of glistening white marble for working out those thoughts in permanent form.

The Three Greek Orders



Doric

Ionic

Corinthian

The Greek architecture family had only three children in it, all quite different from each other. They are called orders and the distinguishing feature of each is its style of capital. The earliest was the simple Doric with no decoration but its own good lines. The second to grow up was the Ionic, which, as you see, has a graceful bolster roll for the roof to rest upon. Decorating this roll is the egg and dart design and, in the true Ionic capital, there is always this border below the roll. The Corinthian is the youngest of these three Greek children and was very popular with the Romans. The Corinthian capital is the most elaborate of the three and may be compared to a basket grown over with acanthus leaves, which is what it was copied from. Each of the three orders has a certain kind of molding and roof decoration which best suits its particular style.

When, in the Age of Pericles, the Greeks were at their best, the Acropolis at Athens was crowned with buildings. The Parthenon, of which only this scarred ruin remains, was the most beautiful of them all. It is built in the Doric order, the earliest and simplest of the three styles of Greek architecture. The Erechtheum, which stands near the Parthenon, is Ionic. It is chiefly famous for its caryatid pillars—tall female figures that bear the weight of the porch roof on their heads. They represent the caryatids—priestesses who officiated in that temple.

Though the centuries have left us very little of the Parthenon, it is regarded as the most perfect in design and workmanship of any building man has constructed. It is simple and dignified without being massive; its lines are symmetrical and beautiful. It was 220 feet long and 100 feet wide, and housed a majestic gold and ivory statue of Athena Parthenos

A Roman Temple



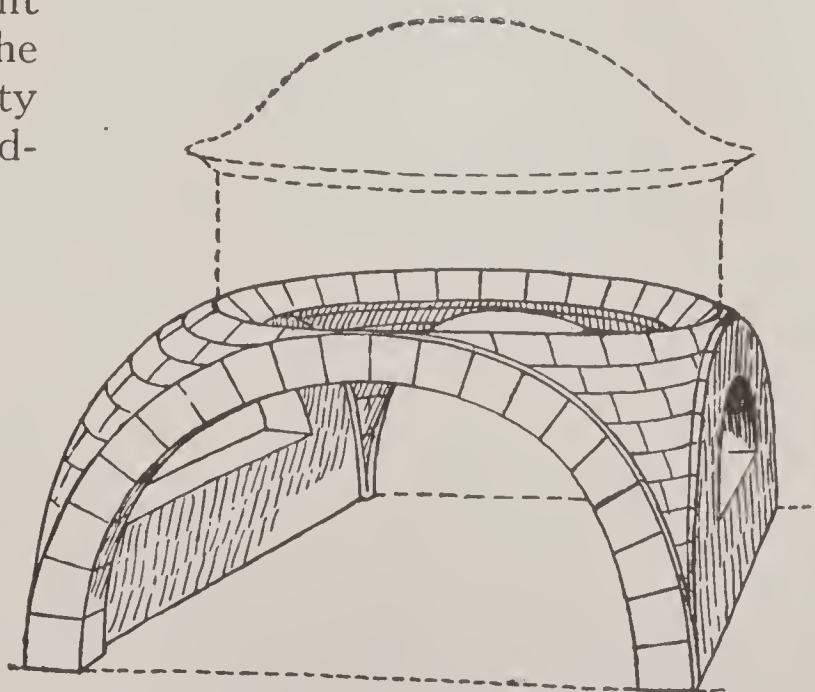
The Pantheon in Rome shows how the Romans used the Greek style in combination with ideas of their own. A porch with Corinthian columns and a pediment above them, as in the Parthenon, is added to the main part of the building which is a vast circular enclosure, supporting a dome. The building is lighted by a big window in the dome and its great wall is 20 feet thick. There are eight niches in this wall, holding statues of the chief Roman gods, for the Pantheon was a temple to all the gods, as its name tells you. (Pan is a Greek word for all, and theon is the plural of the Greek word meaning god.)

(Athena the Virgin). It was tinted with delicate, rich colors, very different from the gaudy hues of the Egyptians. Looking at the Parthenon, the seemingly simple, straight lines are restful; they give you the feeling of serenity and calm dignity that characterized Athena, the goddess of wisdom.

A Building of Gentle Curves

The lines of the Parthenon are not really straight, but are gentle curves. The pillars all slant slightly inward and swell gently just above the base. The gabled roof helps, too, to keep the building from having the flat look of the temple of Karnak and leaves that triangular space, the *pediment*, for sculpture. The floor rises a little in the center. So does

the roof. Compare the Parthenon with the temple of Karnak and you will see what grace these curves add to the form of a building. No one



The diagram shows a dome supported on pendentives—rounded structures that would be full domes if they were extended. There are many of these in the greatest of all dome buildings, the Hagia Sophia at Constantinople.

The Romanesque Cathedral at Pisa



The facade or face of the cathedral at Pisa is a fine example of how the Romanesque style of architecture resembled the Roman, yet was not quite a copy of it. The Roman arch is there, repeated time and again, and the pillars which the Romans borrowed from the Greeks. The cathedral is built on the Roman basilica plan, too.

but a Greek, with the Greek's eye for beauty of form and delicate balancing of line, could have built the Parthenon.

But the carving is the crowning glory of this wonderful building. There is a frieze of figures around the interior, a broken border around the outside, and each pediment bears a sculptured story about Athena.

How the Romans Imitated the Greeks

The Romans, who followed the Greeks as chief actors on the world stage, were content merely to imitate and develop the Greek models. They were not artists and worshippers of beauty as were the Greeks. They built for utility and strength rather than for the expression of a beautiful

The Church of the Holy Wisdom at Constantinople

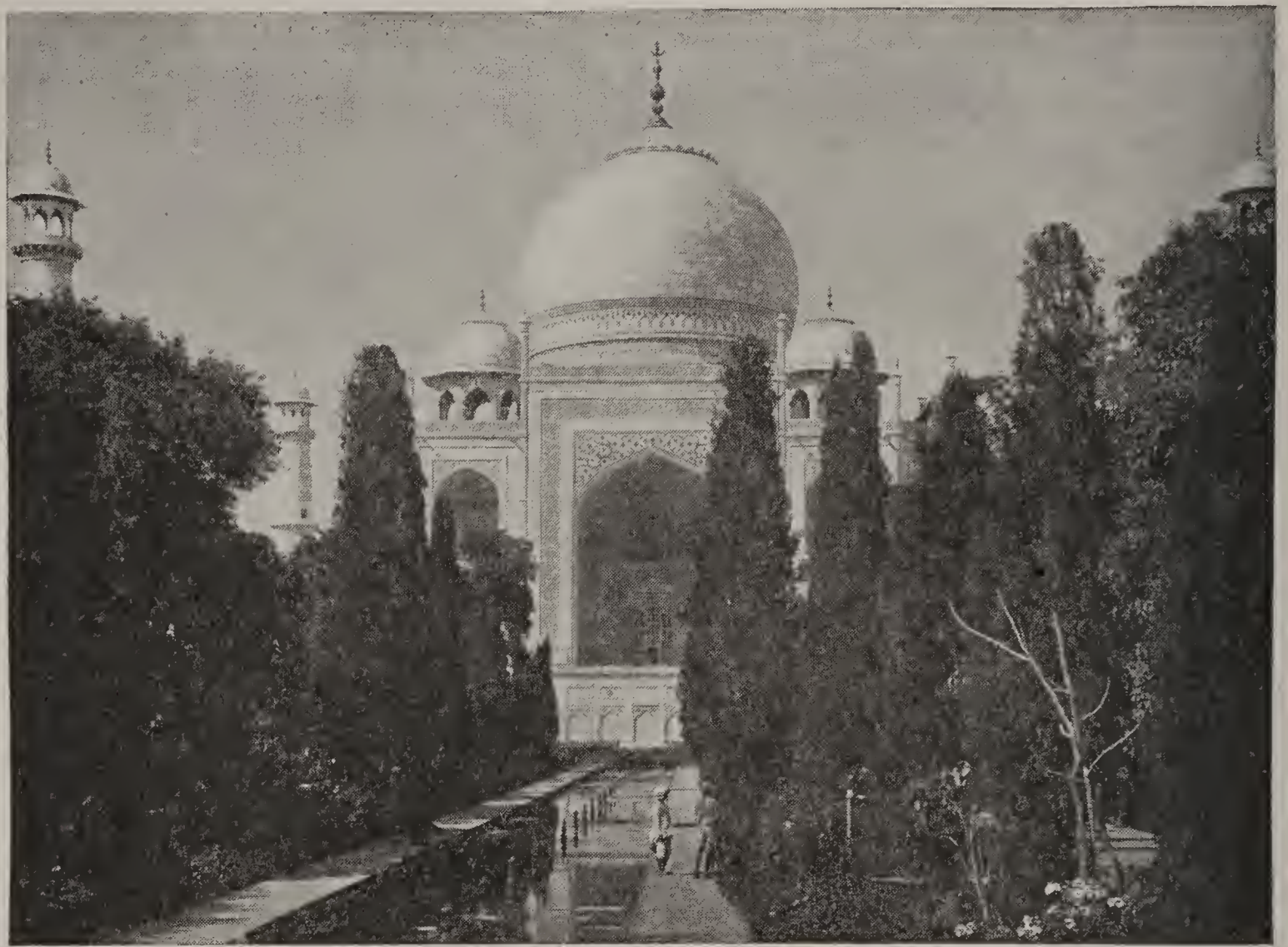


"The Byzantine architects added dome to arch, and arch to dome, until they produced a building whose majestic spaciousness is one of the wonders of the world." The domes of Hagia Sophia are flattened instead of being perfect hemispheres like the dome of the Pantheon. The architects of St. Sophia, which was built from 532 to 562 under Justinian, were Asiatic and probably got their ideas of dome building from the East, instead of from the Roman Pantheon. In 1453 Constantinople was taken by the Turks and St. Sophia became a Mohammedan mosque. The minarets were added then and many of the gorgeous mosaics were whitewashed because they deal with Christian subjects. The splendor of St. Sophia is in its rich interior decorations, which are Oriental in their brilliancy and intricate design.

thought, and they worked on a big scale, for big effects. Though the arch had been known and used by earlier peoples of the ancient world, the Romans were the first to become masters in its use. In the lintel roof the weight rests squarely on the upright supports. When a roof is arched the weight is distributed evenly among the stones composing the arch, and besides the downward pressure of the building's weight, there is a sidewise pressure called the *thrust* of the arch. With the introduction of the arch, the vaulted roof came into use, and later, the dome. The simplest form of the vaulted roof is known as the barrel vault because its shape resembles a barrel



The Magnificent Tomb of an Oriental King



The Taj Mahal was built at Agra, India, by the Mogul emperor, Jehan. It took 20,000 workmen 22 years to finish, and was designed as the resting place for Jehan's favorite wife and himself, but was used as a pleasure palace while they were living. The material is white marble and alabaster, and the whole Koran is written in mosaics of precious stones on the walls of the interior. The Taj Mahal, with its shining, fairy-like central dome, flanked by domed cupolas and minarets, is set in a beautiful grove of dark cypress trees, and has been called a "jewel of Paradise," so unearthly and magnificent does it appear.

sawed in two lengthwise. A diagram of it is shown on page 1952. When two of these barrel vaults are crossed, a groined vault is produced and in experimenting with this form of vaulting, the dome was developed.

Before the Romans came under Greek influence they had built the Cloaca Maxima, a vaulted sewer. They were very fond of domes and round buildings. Their greatest piece of architecture was the temple called the Pantheon. It has an enormous dome supported by a circular wall or *drum*. Do you see the Greek influence in the pillared portico? By architects this is regarded as rather out of place on a round building. Another Roman building which illus-

trates the Roman habit of doing things on a big scale is the Colosseum. You have read about the fierce gladiators who fought each other in the arena while all Rome looked on. The Colosseum was built to accommodate the vast crowds that came to these cruel combats. It is in the form of a circle and uses all three of the Greek orders as well as the arch. The Greeks never mixed different styles, but the Romans were careless about such things, and because their work was on such a big scale, the lack of uniformity was not a wholly bad feature.

Origin of Byzantine Art

The vast territory governed by Rome became unwieldy for one man

to manage, so it was divided between two emperors and a second capital was set up at Byzantium. Then thousands of huge blond savages from the north came swooping down upon the western half, destroying everything in their path, and it was Byzantium, or Constantinople as Constantine named it, that guarded the knowledge and art of the ancient world against destruction, for a thousand years. So we must also visit the Turkish capital where we shall find the half Oriental and half European style of architecture known as Byzantine. The Byzantine architects were not content with the vaults and drum-supported domes of the Romans. Influenced by their Asiatic neighbors, they worked out a new style of their own. They added dome to arch, and arch to dome until they produced a building which, for spaciousness,

grandeur and majesty, is one of the wonders of the world—the Hagia Sophia, Church of the Holy Wisdom. It was built by Justinian in Constantinople in 532 to 562. The central dome, 180 feet high, rests on four great arches that form a square, instead of on a circular drum as in the Pantheon. Piers (masses of masonry acting as supports) carry the arches. The aisles and galleries are formed by column-supported arches that lead the eye upward past a series of domes and semidomes to the glittering gold of the biggest one of all. The forty windows set round the base of the big dome light up the gorgeous marble and mosaic-lined walls with wonderful effect.

The Byzantine style, remember, is a dome style, so when you see a domed building you can think of the Byzantine builders of faraway

A Byzantine Church in Italy



Byzantium, or Constantinople, was a prosperous, brilliant city when most of western Europe was ravaged and desolated by the barbarian invasions and ceaseless civil wars. Her commerce made her the true capital of the world and her art was copied in both East and West. So it is not strange to find this Byzantine church in northern Italy. It is the Cathedral of St. Mark's in Venice, and except that there are no minarets, we might almost mistake it for one of the Mohammedan mosques, since the Mohammedans used the dome style more widely than the Christians.

A Flying Buttress



"Besides the straight pier buttresses, another kind, called the flying buttress, came into use." As you see, a flying buttress is a half-arch braced against the wall of the clear-story and carried on a pier of masonry.

Constantinople and their wonderful Hagia Sophia. In America we are especially fond of putting domes on our government buildings; and, it must be added, of mixing Greek pillars and Roman arches with the domes.

The Mohammedans and Their Art

The Mohammedans set out to conquer the world for Islam and in the attempt they learned many things from the people they conquered. They did not succeed in taking Constantinople until the fifteenth century, but long before that their round and bulb-shaped domes, flanked by towering minarets, had sprung up all over the eastern world. A minaret, you know, is a tower from which the Mohammedan priests call the

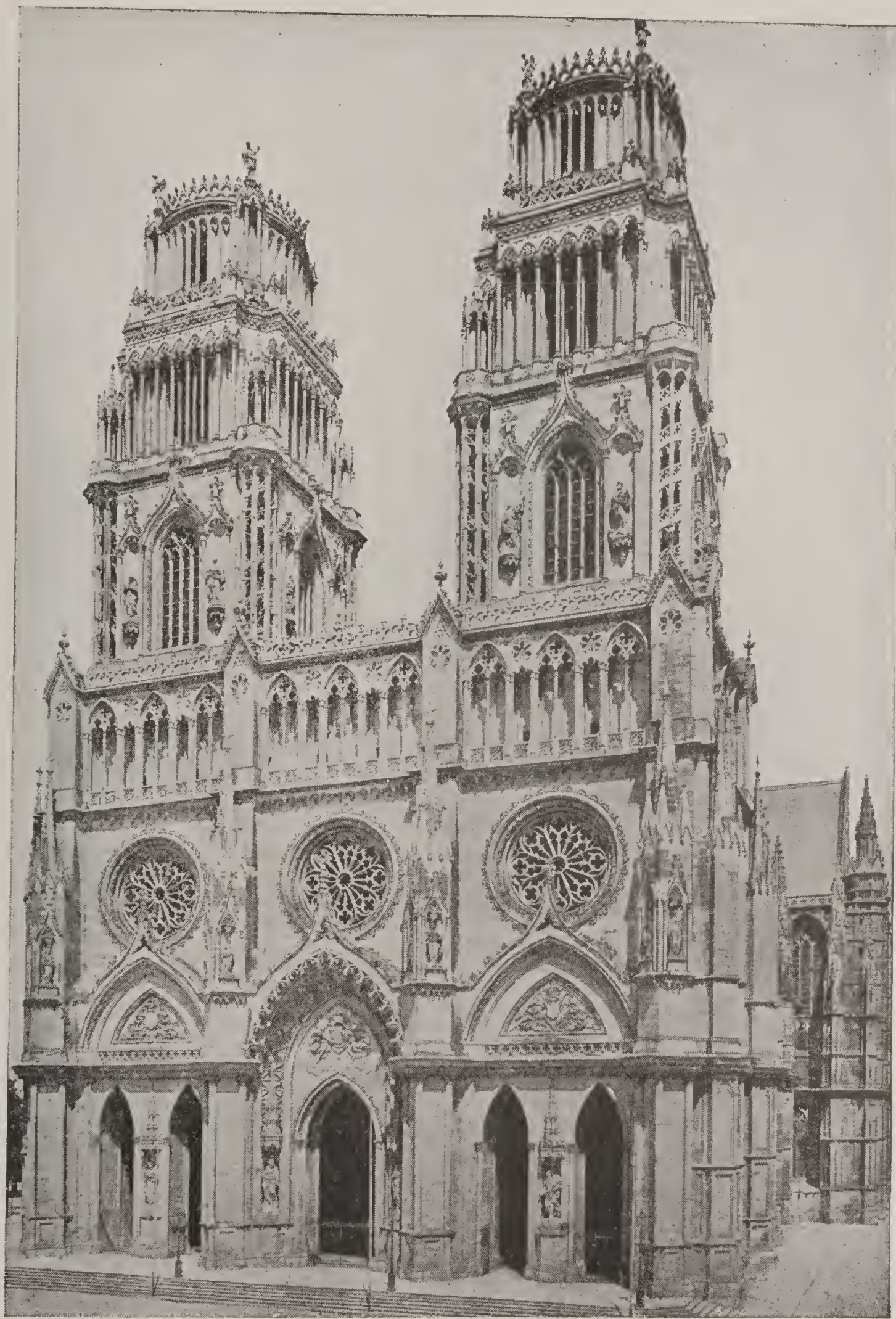
people to prayer. You can usually find four of these minarets on a mosque, one at each corner. The plan of a mosque is simple. There must be a fountain of water in the center, because ablutions are a part of the Mohammedan ceremonial; a prayer hall with a niche pointing toward Mecca, and a tall, slender pulpit from which the Koran is read. The roofs of the early mosques were domed, vaulted or flat and the interiors were always covered with elaborate geometric designs in bright colors. The Mohammedan religion, in its hostility to idol worship, forbids the



Why Sainte-Chapelle Seems All Windows and No Walls

The Sainte-Chapelle at Paris was built in the thirteenth century to house a splinter said to have been a part of Christ's crown of thorns. It is attached to the Palais de Justice, which was at that time a royal residence. From the inside the building seems to have no walls at all, only beautiful traceried windows. Looking at the picture, you will soon see the reason for this effect—the buttresses make strong, thick walls unnecessary, for they are the real supports of the arched roof.

Orleans Cathedral



The cathedral at Orleans was begun in 1287, but three centuries later, when it was still unfinished, it was burned by the Huguenots, who, as persecuted Protestants, opposed everything undertaken by the Catholics. It was not finished until 1829, so, though Gothic in style, it was not built during the Gothic period and does not show the purest and best Gothic workmanship.

The Slender Spires of the Gothic Style



Milan Cathedral in northern Italy was built largely by German architects, so it is not a truly Italian building. The cathedral itself, the third largest in the world, will house 40,000 people and shows the typical Gothic style in its myriads of slender spires and statue-ornaments. There are 4,440 carved figures on the exterior alone. In the eighteenth century, though begun 500 years before, the cathedral was not finished, and a Renaissance facade was added. As this was out of keeping with the rest of the building, its removal was begun in 1900 and a true Gothic front built.

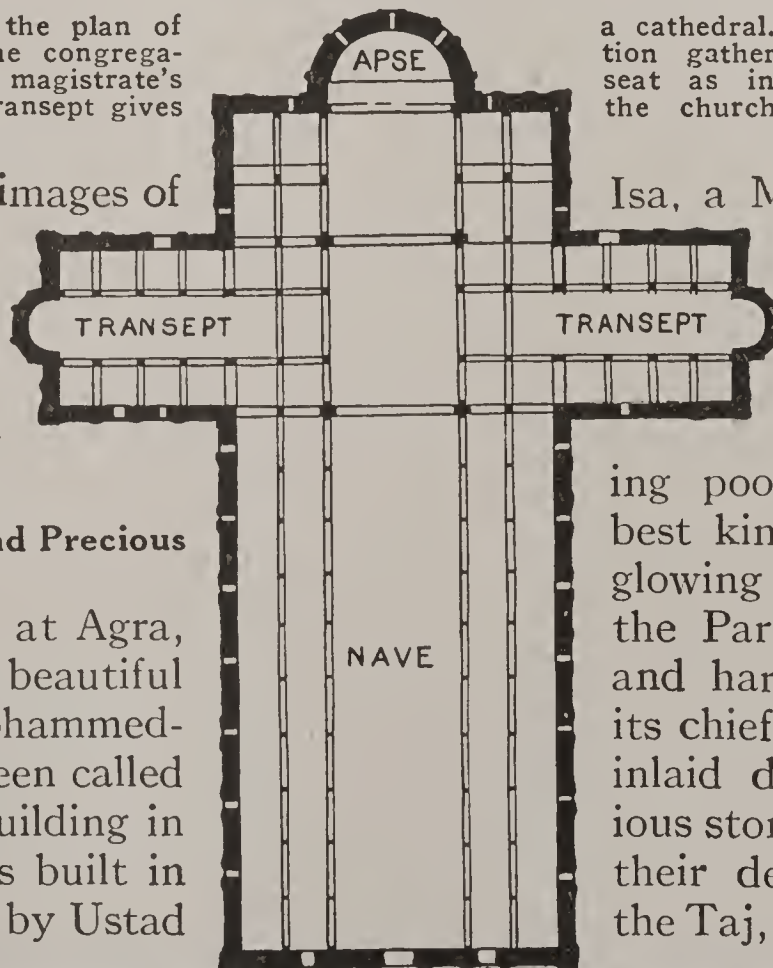
The diagram shows the plan of central space where the congregation gathers. And, as you see, the transept gives form of a cross.

a cathedral. The nave is the long place where the congregation gathers. The apse contains the altar as in the Roman basilicas. the church the very appropriate

making of graven images of persons or things, so the Mohammedan artist must confine himself to designed decorations.

A Poem in Marble and Precious Stones

The Taj Mahal at Agra, India, is the most beautiful building in the Mohammedan style and has been called the most poetic building in the world. It was built in 1652 and designed by Ustad



Isa, a Mohammedan architect. The Taj is surrounded by a landscape garden whose dark green trees and glistening pools make the very best kind of setting for its glowing white marble. Like the Parthenon, its balance and harmony of line are its chief charm, though the inlaid decorations of precious stones are wonderful in their delicate beauty. In the Taj, as in other Moham-

GREAT WORKS OF ARCHITECTURE

medan buildings in Persia, Syria, Egypt and Spain, they changed the flat dome of the Byzantines to a pointed, bulb-shaped structure.

Origin of Christian Architecture

While the fiery, fanatical Mohammedan faith was spreading over the

eastern world and threatening to swallow up the slowly waking civilization of the West, the Christian monks were working to bring about peace and brotherly love among the warlike barbarians. There was so much trouble and bloodshed and strife for

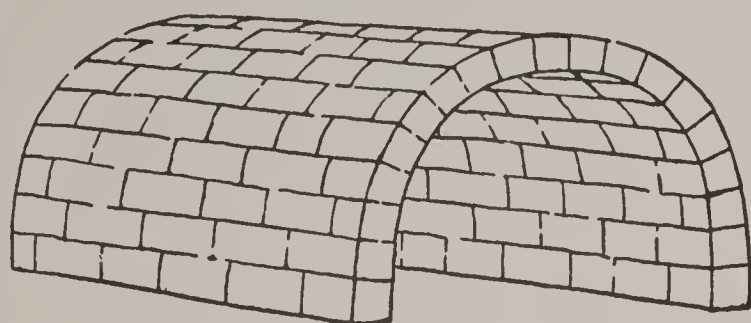
The English Gothic



Westminster Abbey, where for centuries the kings of England have been crowned and her great men laid to rest, is typical of the English Gothic style. Compare it with the pictures of French and Italian churches and you will see how it differs. Westminster's walls have straight and solid lines. It was in England that the perpendicular Gothic was used most, and Westminster is built in that style. The French gained their effect of mystery and lightness by hundreds of high, slender towers and rich, minute decorations. Westminster has a sober, serene look, because it is longer and lower than the French cathedrals, and its towers are rather squat and blocky. The greatest charm of this building is in the beautiful perpendicular traceries and moldings, and in the fan vaultings of the interior.

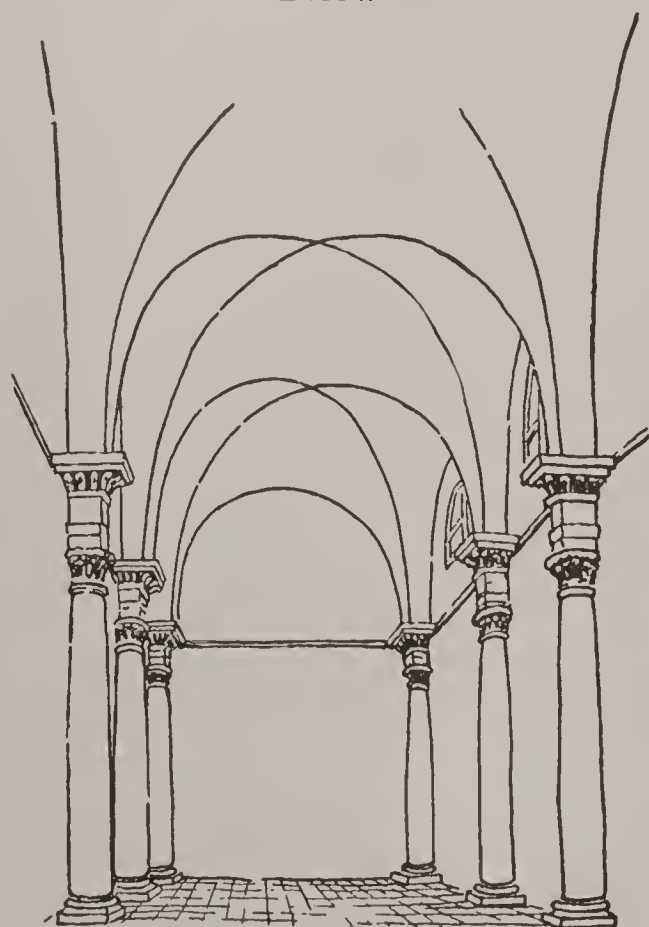
a long time after the fall of Rome that there was neither time nor money for beautiful buildings. The earliest Christians had worshipped secretly in catacombs underneath Rome and in

Barrel Vault



private houses. But in 325, Constantine made Christianity the legal religion of the Roman Empire and the Christians could worship openly in churches of their own. The basilica was the type of public building most used by the Romans. Like the diagram of a cathedral on page 1950, it had a long central space called a *nave*, a rounded-out end or *apse* where the magistrate sat, and aisles along the sides of the nave. The roof was usually flat, supported by columns and arches, while the apse was

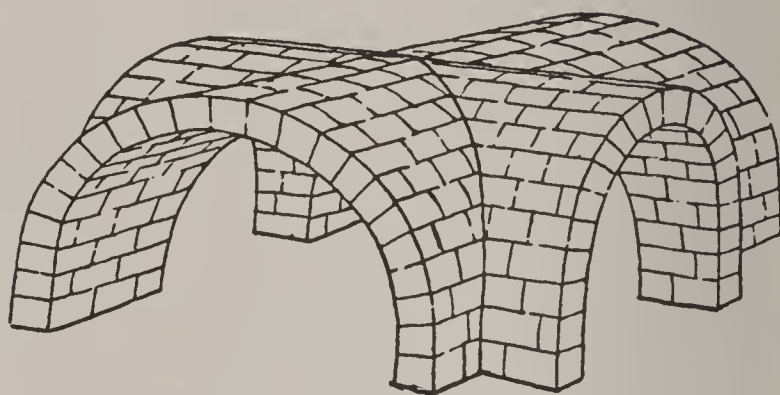
How a Groined Vault Looks from Below



vaulted. It was quite natural that when the Christians began to build churches they should take for their pattern the plan that was most familiar to them, so we find the first Christian churches nothing but basilicas with an altar in the apse. A little later they added the *transept*, that crosswise aisle in front of the altar. What does the shape of the building remind you of? Yes, a cross.

But the Goths and Franks who had overthrown the Romans had ideas of their own, so we find the basilica churches changing a little as time goes on. The architecture that devel-

Groined Vault

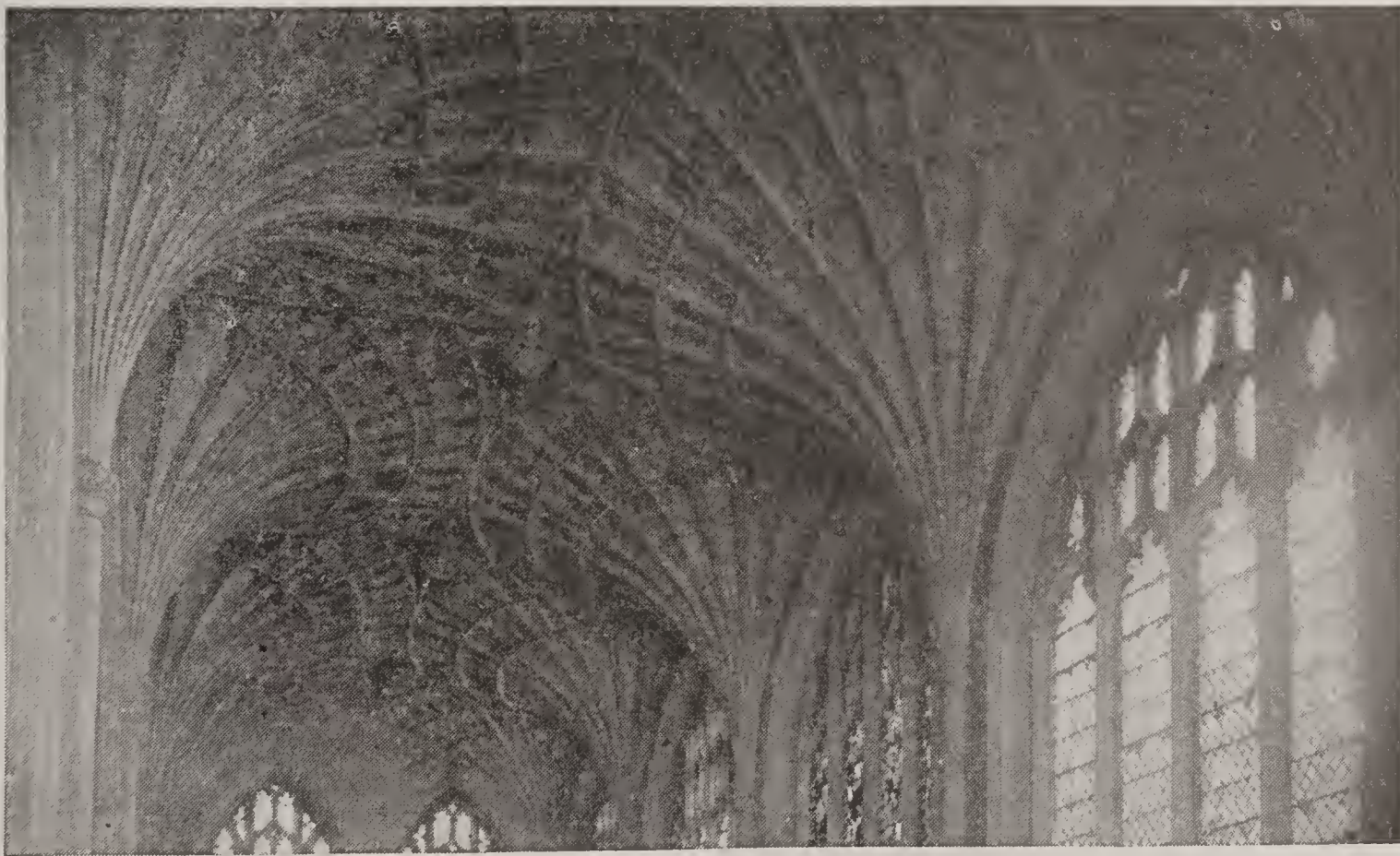


oped was called Romanesque and was a blending of the old, known forms. There were round arches and columns combined to make tier upon tier of arcades as in the cathedral and leaning tower at Pisa. And other churches, like St. Mark's in Venice, show the influence of Constantinople in their domes and semidomes. Then towers began to appear among the domes, standing alone with the town bell in their tops or as a part of the Romanesque castle, church, or monastery. Can you think of anything in the life and habits of the times that taught the Romanesque architects to build them? You remember in those fierce, lawless days every baron had his castle stronghold defended and watched over by staunch towers of heavy masonry. Some of these castles, especially those built by the Germans, are truly beautiful pieces

Gothic Vaulted Ceilings



Above you see a fine example of ribbed vaulting. Instead of making the vault a solid structure as in the barrel or groined vault, there is a skeleton support of ribs. Besides being easier to



manage than the uniformly curved vaulting, ribbed vaulting offers a splendid chance for decoration. It makes a beautiful ceiling. The fan vaulting of Westminster Abbey, shown in the lower picture, is a further development of ribbed vaulting. The ribs are built to extend outward in all directions, an even distance apart, from the supporting pillar.

of work. And from the custom of building towers for defense came the use of towers for other purposes.

The Architecture of the Middle Ages

But the Romanesque was only a stepping-stone to the Gothic architecture that was the crowning glory of the Middle Ages. The Greeks built a flat roof, supported by pillars; the Romans used the arch which grew into the dome in the East. It remained for the western builders to take up the work where the others had left off and, in trying to find a way of making fireproof ceilings, to produce the lofty, vaulted stone roofs and slender spires of the Gothic cathedrals, the builders went back to the groined vaults of the Romans. The thrust of a barrel vault is evenly distributed—it pushes uniformly outward. With the groined vaults of the Gothic style, the weights and strains of the building, instead of being distributed evenly along the curved surface of the vaulting, are concentrated at a few points from which the arches spring; and these points of strain are strengthened by piers and buttresses, leaving room for great stained-glass windows with their marvelous traceries. The buttresses were continued up into a myriad of towers and spires to give them strength and weight. The columns, instead of standing solidly and majestically alone as in the Greek buildings, were made more slender and were grouped. The arched doorways, the facades of the buildings and the roof-cornices were ornamented with intricate patterns of carving, leering gargoyles and beautiful moldings. A gargoyle is a figure used to discharge the water from a roof corner. Many of these gargoyles were made to represent grinning devils, dragons and evil spirits.

In comparing Notre Dame with the Parthenon you feel the contrast between the simplicity of the Greek and the intricacy of design of the Gothic temple. A Gothic cathedral has a different beauty from that of a Greek temple. It is rich, as old lace with a delicate pattern of fine, interwoven threads is rich. It is mysterious, that is, you cannot see at once everything to be seen in it; it leads you back again and again. And each time you look, the wonder and beauty and majesty of it grows.

These Gothic cathedrals are the true voice of the higher aspirations of the Middle Ages. The cathedrals were begun at a time when warring nobles were more often at peace, and rich townsmen began to build beautiful churches and fine homes; a time when trade and industry were developing. The energy and idealism of the Teuton tribes were being organized and guided by Roman ideas of law and empire, and above all, the Christian church was inspiring the souls of men with the pure white flame of faith and self-sacrifice. The monks had striven and taught and suffered martyrdom until the barbarian warriors developed ideals of chivalry in the midst of their harsh feudal system, threw themselves against the Mohammedan Turks who held Jerusalem, in wave after wave of desperate attack; and their architects and their workmen expressed this fervent devotion in stone and marble and colored glass in the cathedrals of Notre Dame, Rouen, Amiens and Cologne.

When the Workmen Were Artists

In the dark ages after the fall of Rome, no one but the monks could build in peace. But now the laymen had time to learn the mason's and stonecutter's art and to organize into

The Cathedral of Notre Dame in Paris



There are many Notre Dames, but the Notre Dame of Paris is the greatest of them all—by some people it is thought to be the most beautiful of Gothic churches. The perpendicular lines of its facade, cut by the horizontal row of figures in their niches and by the slender-pillared gallery above, give it a simple dignity quite different from the effect produced by the intricate ornamentation of some of the other Gothic cathedrals. The row of figures above the doorways represent twenty-eight kings of Israel. One of the most beautiful features of Notre Dame is the great rose window in the end of the transept, of which you can catch a glimpse at the right of the picture.

guilds. Guilds were the medieval trade-unions, that protected the workmen against oppression and made sure that the goods produced were up to standard. Most of the great cathedrals were designed on a larger scale than could be worked out, and the original plans were often changed many times during the hundreds of

years the cathedral was in the course of construction. The master builder often left the working out of details to the fancy of the workmen, who were artists in their own lines. The result was square-capped towers where spires had been intended; a great mass of carvings and sculptures, different in pattern; wings, windows

A Cathedral in the Late Gothic Style



Three centuries were required to build Rouen Cathedral. Parts of it are early Gothic and very good, but the facade, shown here, is in what is called the Flamboyant style, when the fancy of the Gothic builders ran to intricate designs of stone fretwork, a profusion of pinnacles and ornaments. Compare it with Notre Dame Cathedral and see which one you think the more beautiful.

and chapels begun on a large scale and finished hastily in a totally different manner. Such things are characteristic of the Gothic buildings.

The use of groined and ribbed vaulting concentrated the strains of the building at a few points so that the roof was really supported on legs—the piers and buttresses—and the spaces between were filled by stained glass windows, which from the interior gave the building the appearance of having almost no walls at all. And it made possible the use of lighter and more delicate columns

A Traceried Rose Window



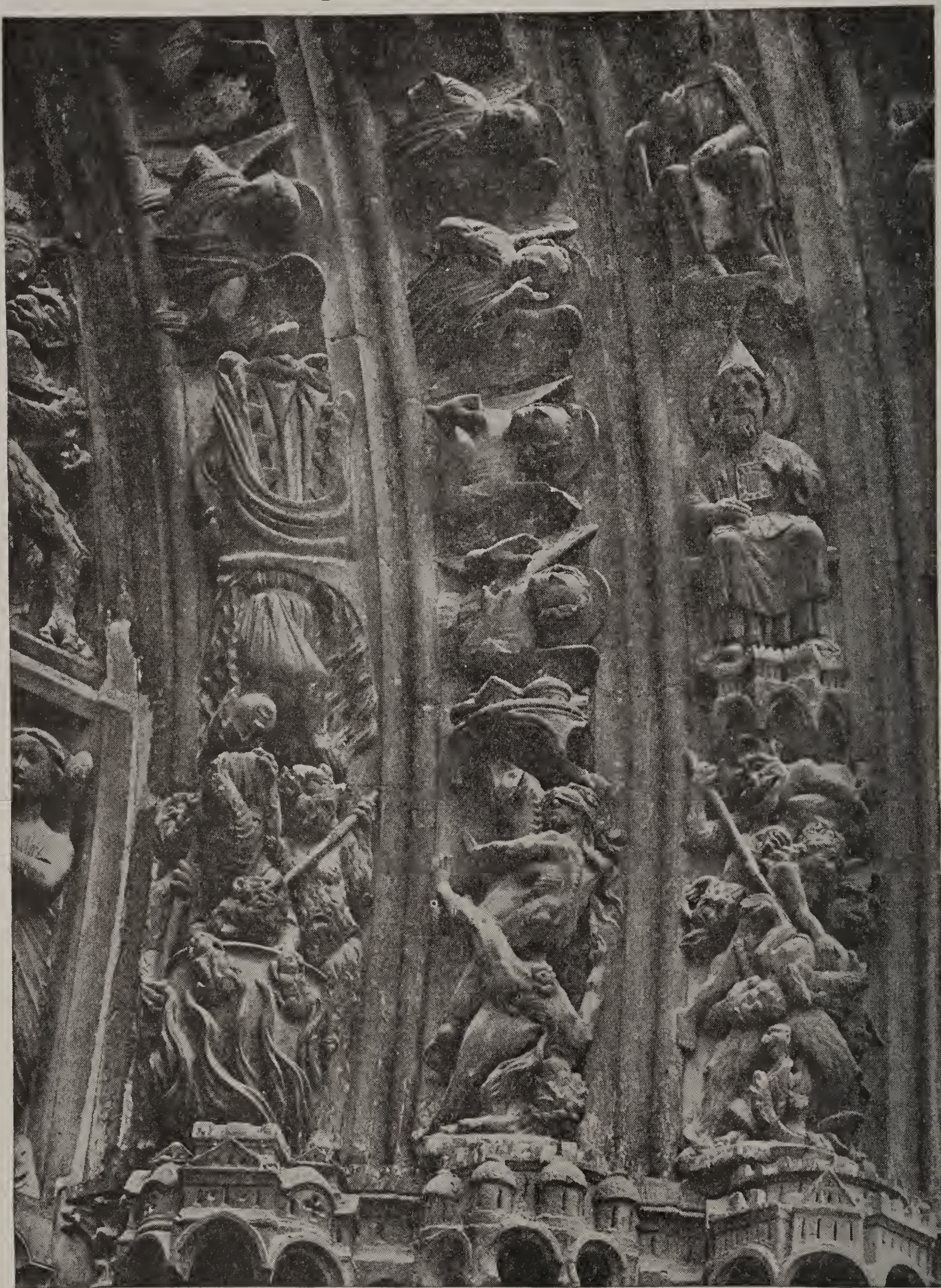
One of the Banished Devils



Gargoyles, like this one, are to be found on most Gothic churches. They are placed at the corners where the eaves poured their water to the ground. The name gargoyle comes from the "gurgle" made by the water as it runs down. Some of the gargoyles are animals and many, like this one, are devils or evil spirits supposedly driven out of the church by the power of good within.

in the interior where the weights of the roof did not fall. Besides the straight pier-buttresses, another kind, called the flying buttress, came into use. The master builders of the twelfth and thirteenth centuries built flying buttresses on the outside to meet the thrust of groined vaults within, and also to take away the heavy look that a plain-buttressed wall sometimes has. The picture shows you what a flying buttress is—a sort of half arch from the main wall of the clear-story to the pier support, pushing sidewise as all arches do, only its push is inward *against* the push of the vault arches forming the ceiling of the cathedral.

The Spirits Over the Doorway



The elaborate richness of Gothic cathedrals is due in part to carvings like this, from one of the doorways of Notre Dame. It shows you what the early and best Gothic decorations are like. Rows of carvings like this are used to face the wide space left exposed when the heavy walls were cut through. Angels, cherubim, saints, devils and tortured souls are mixed up, helter-skelter and upside down. The elaborateness of these carvings are partly responsible, too, for the long periods of time required to finish some of the great cathedrals.

When Ornament Was Overdone

The earliest buildings in the Gothic style had very pointed arches, but as the style grew older the arches got rounder and lower, until, in the fifteenth century, the beautiful slender lines of the early Gothic almost disappeared. The same thing happened to the capitals and mouldings. At first they were simple and in good taste, showing the pretty dog-tooth design and prim arrangements of leaves. In the fourteenth century, or middle Gothic period, the carvings were more numerous and not so conventional, but always well placed. By the fifteenth century the foliage on the capitals ran riot like an unpruned vine, and arms and crests and mottoes were used for decoration instead of designs from nature. There was a similar change in the appearance of the windows. With the early, very pointed arches, two simple windows were often combined under one arch. Later, various forms of tracery—that is, the stone framework supporting the glass—were used until, in some of the elaborate rose or round windows of the fifteenth century, the glass was only used to pick out the pattern of the stone which supported it. Another form, the perpendicular, which divided the window into geometric figures, became popular, especially in England. In fact, the whole tendency of the later Gothic was toward straight lines.

When the Mind of Europe Was Reborn

But in the sixteenth century, while the Gothic was becoming too flam-

A Gothic Carved Figure

boyant and losing most of its former graceful charm, a new movement was developing in Italy. The Middle Ages, as we have seen, were a time of fierce warfare and bitter struggle, in spite of the higher ideals of the Church. But now men began to believe in individual freedom. The fall of Constantinople in 1456 drove many Greek scholars with their precious store of ancient knowledge, to Italy; the vast trade and good seaman-ship of the Italians led them to explore unknown lands, thereby proving many of the old theories about the earth

to be false; the guild system made common people rich and powerful and taught them to rebel against unjust rule. The invention of printing made books so common and cheap that it was much easier for the average man to learn how to read. And with this knowledge the churches and monasteries lost much of their influence over the minds of the people, because it was the monks who had been the only educated men, the teachers of the rest of the world. It was a period of profound intellectual awakening. This great change came about first in Italy and from there spread over the rest of Europe. The surge of new ideas, the awakening of sleeping forces was called the *Renaissance*, which means "New Birth."

The Spread of New Ideas

The awaking started when men began to realize and study the beautiful things the Greeks and Romans had made and said. In

An Italian Villa of the Fifteenth Century



How different from the Gothic cathedrals! Strozzi Palace, in Florence, was built in the early days of the Renaissance style. It is refined and very simple, and, though it has something of an air of gloom about it, it is in exquisite good taste. Notice how the architects have forsaken the pointed arches of the Gothic builders and gone back to the round arch and straight lines of the classic Roman.

architecture a mixture of the old Roman forms—the pillars, round arches, domes and pediments—with the already existing styles, began to be used. In this way a new style called the Renaissance style, was produced. It developed first in Italy, then in France, and later in Germany, England and Spain. Men had thought it a sin to build anything beautiful or adorn it richly unless it was to be put to a religious use. Now noblemen and even rich merchants built beautiful homes, there were fine public buildings and pleasure palaces. The Louvre, the great art museum in Paris, was built at this time. But probably the greatest work of the period was still done on the churches—of which St. Peter's

in Rome and St. Paul's in London are examples.

At first the Renaissance buildings had simple, fine facades and lovely courtyards inside. In England gable roofs and dormer windows were very popular. The later, seventeenth and eighteenth century Renaissance, became too close a copy of the classic originals, not suited to the time nor the purpose for which it was used. Most of the decorations were too heavy or else there was too much of them. All three orders were used at once, and many buildings were built with colossal columns reaching to the third story, too massive for the roof they were used to support.

In England the Renaissance style goes by different names—"Eliza-

The Largest Church in the World



St. Peter's, in Rome, is the largest church in existence and was begun at the order of Pope Nicholas V. Part of it is the work of one of the greatest artists of all time, Michelangelo. Most of it was built during the sixteenth century, at the height of the Renaissance period. Its single, massive Greek columns and vast central dome show the harking back to Roman ideas. That great dome is 140 feet in diameter and rises 405 feet from the ground. In fact, everything in St. Peter's is built on so huge a scale and is so perfectly proportioned that you do not realize its vast size at once. It is just the reverse with the Gothic churches, you know—the mass of fine details and the dividing up into many parts make the whole look larger than it really is.

bethan" for the early type introduced under Queen Elizabeth, and "Jacobean" for the later period. St. Paul's, the great London cathedral, was built about this time. Can you tell how it shows the Roman influence? See how its dome differs from that of Hagia Sophia. It is built up on a high drum like that of the Pantheon and, like many Romanesque buildings, is capped with a short spire called a lantern.

Contrast Between Greek and Gothic Ornament

The Greeks built simple structures with a few beautiful sculptures for ornament. The architects of the Gothic style covered their churches with carvings, but these carvings fitted in with and helped work out the general scheme of the whole. The later Renaissance builders lost their sense of proportion and fitness. In the Rococo style that developed in

the eighteenth century, there were scrolls, shells, fruit and cupids, all jumbled together in the most unseemly fashion. Many of our amusement park pavilions are copies of this style. Then there was a second classic revival in which the builders went back to Greece instead of to Rome, for their models. The first Renaissance columns had been largely Corinthian. Now the severe Doric was brought to life and made to do duty without the beautiful sculptures to relieve it, and the result was an architecture that was, for the most part, bare and cold. And yet many truly beautiful buildings were produced during this period.

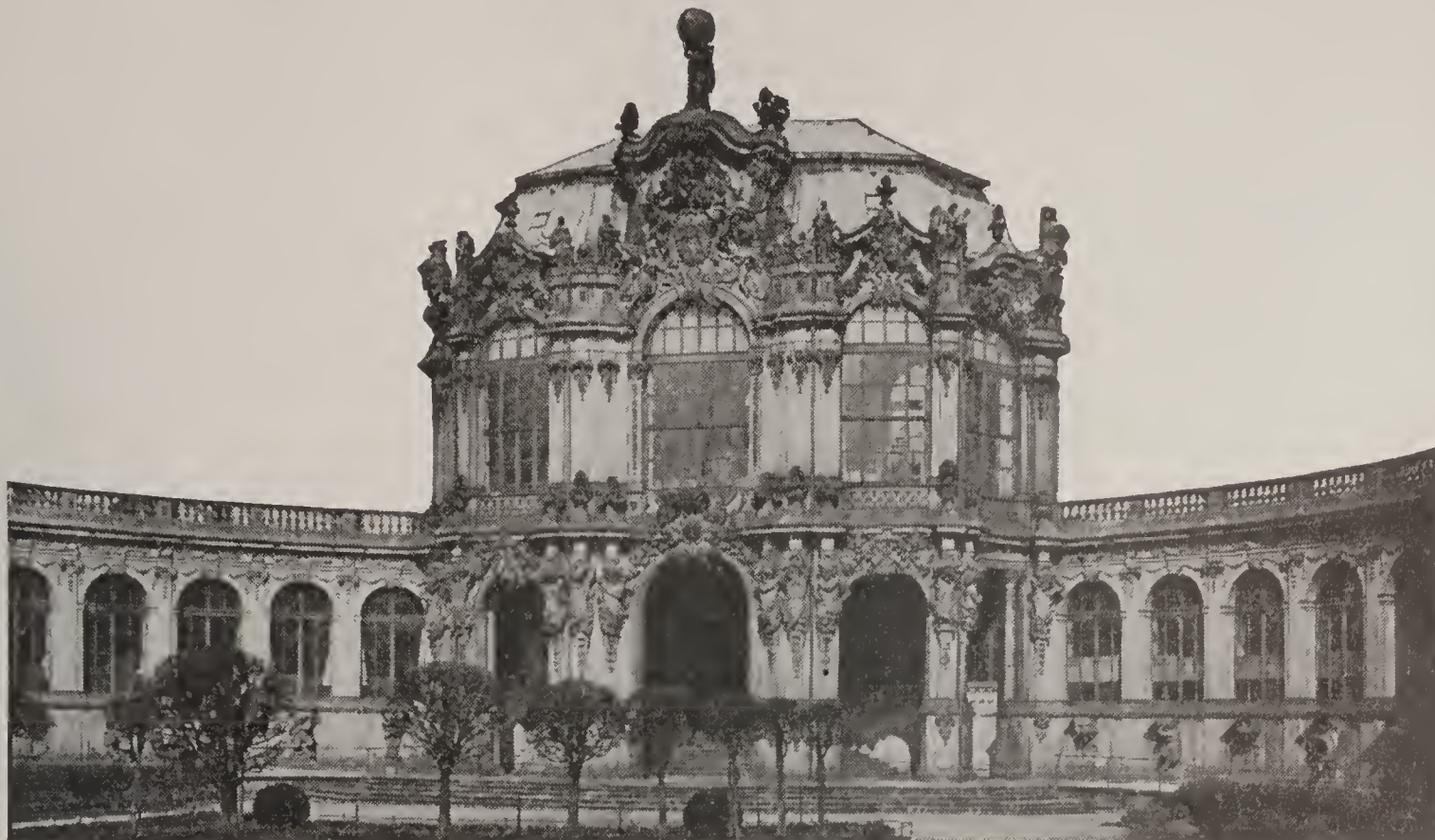
This brings us down to modern times and our sight-seeing trip through a modern city. You will find all these types and styles we have been looking at right here in our own country. What styles can you find

Another Renaissance Church



St. Paul's, in London, is another church in the Renaissance style. It was built by Sir Christopher Wren about a century later than St. Peter's. The dome is smaller and is flanked on the west front, which we see here, by two lofty bell turrets. The peristyle—the row of columns surrounding the drum—is one of the best features of the building. Do you like domes lantern-capped, as in St. Peter's and St. Paul's, or flat, as the Romans built them?

This is What "Rococo" Means



Here is another example of overdone ornament. It is Zwinger Palace in Dresden, built in the Rococo style. Just as the Gothic developed into the too elaborate flamboyant style, the simple, severe Renaissance, that gave us the Strozzi Palace shown on page 1960, degenerated into fantastic form like this—"fussy" buildings ornamented with masses of cupids and garlands and scrolls.

A Beautiful Modern Doorway



St. Bartholomew's in New York City is a fine modern church in the classic style. This doorway is considered very beautiful in its truly Greek simplicity—severe, straight lines enriched by exquisite sculptures.

The Cathedral of St. John the Divine



St. John's the Divine in New York City is not a copy of any one known style. It strives to express our American idea of what a church should be in our own way. And it ranks with the noblest and best of Europe's works of architecture. As you see, the general effect is Gothic, but the round arches and rounded projections are Romanesque. It is an enormous structure, 100,000 square feet in area, and its central spire is more massive than any tower of Gothic construction. Because New York's population is made up of so many different peoples, the worshippers in St. John's speak many tongues. To provide for them all, seven circular chapels have been built around the east end—you are looking at the west front here. They are called the Chapels of the Tongues, and services are held in them in seven different languages. St. John's was built under the guidance of Ralph Adams Cram, who believes fervently in the development of a new, American style of architecture.

in the public library in your town? Our capitol at Washington is in the Renaissance style, with its drum-supported dome and rows of single columns. You can find Gothic elements in most churches in America, where there are no time-honored traditions, because the Gothic style so well expresses the religious sentiments. Here in America, in response to business needs we have invented the skyscraper. You have read about the skyscraper in the story of the Builders. It is

the only truly new style we have. A few American architects are working to produce an original American style, not only in churches like that of St. John the Divine in New York, but in cosy little homes on our western plains, and in great, towering skyscrapers like the Singer building in New York. But we cannot produce anything great and beautiful in architecture or anything else, unless we have fine, noble thoughts in our hearts to express, for it is the builder's soul that makes architecture.

THE HOW AND WHY OF COMMON THINGS

THE SEVEN WONDERS

The Seven Wonders of the World

IN the ancient world there were seven works of man that excited the wonder of the world. Four were buildings, two statues, one a beautiful terraced park. They were the pyramids of Egypt, the temple of Diana at Ephesus, the pharos, or lighthouse, at Alexandria, the mausoleum, or temple tomb of King Mausolus of Caria in the Holy Lands, the statue of Jupiter at Olympia, by Phidias, and the Colossus of Rhodes. The seventh wonder was the hanging gardens of Queen Semiramis of Babylon. We can more than match some of those wonders, but our idea of what is wonderful has changed. The things that astonish us most are scientific discoveries and inventions. The telephone and wireless telegraph, the steam locomotive, and electric light and power are things to be proud of. The discovery of radium, the invention of the spectroscope, and the use of ether to make people undergoing surgical operations insensible to pain are other wonders. Some would include the discovery of germs, as the causes of certain contagious diseases, and leading to their prevention and cure as one

*Wonders,
Ancient and
Modern*

of the modern wonders. That makes eight. Can you think of any more?

Now doesn't it seem rather strange when you come to think of it, that there should have been exactly seven wonders, as if just that number had been laid out in the first place? Yet, you see, that couldn't be. For one thing, when the Egyptians built the pyramids—the only one of these seven ancient wonders, by the way, that we have left—the Greeks didn't exist and so the Egyptians couldn't have foreseen there would be six more big things built for the world to wonder at.

The reason of the limitation was that from the early history of mankind seven was, by many nations—among others, the Greeks—regarded as a mystic number. So the Greeks were the first to think of cataloging the world's wonders in an exclusive list of seven. The list was made by a certain Antipater of Sidon about a hundred years before the birth of Christ. Then the Romans adopted it, and from them it passed on down through the learning of the Middle Ages to the present day.

*Why Just
Seven
Wonders?*

The Pyramids



THE pyramids were tombs built by Egyptian kings for themselves, because of their belief that as long as a man's mummified body was preserved, his spirit would continue to live, but that if it was destroyed his spirit would die.

These pyramids are enormous masses of masonry that required great engineering skill to build. For many years it was not known what their object was, for the rooms which contained the mummies were hidden and sealed. Later the rooms

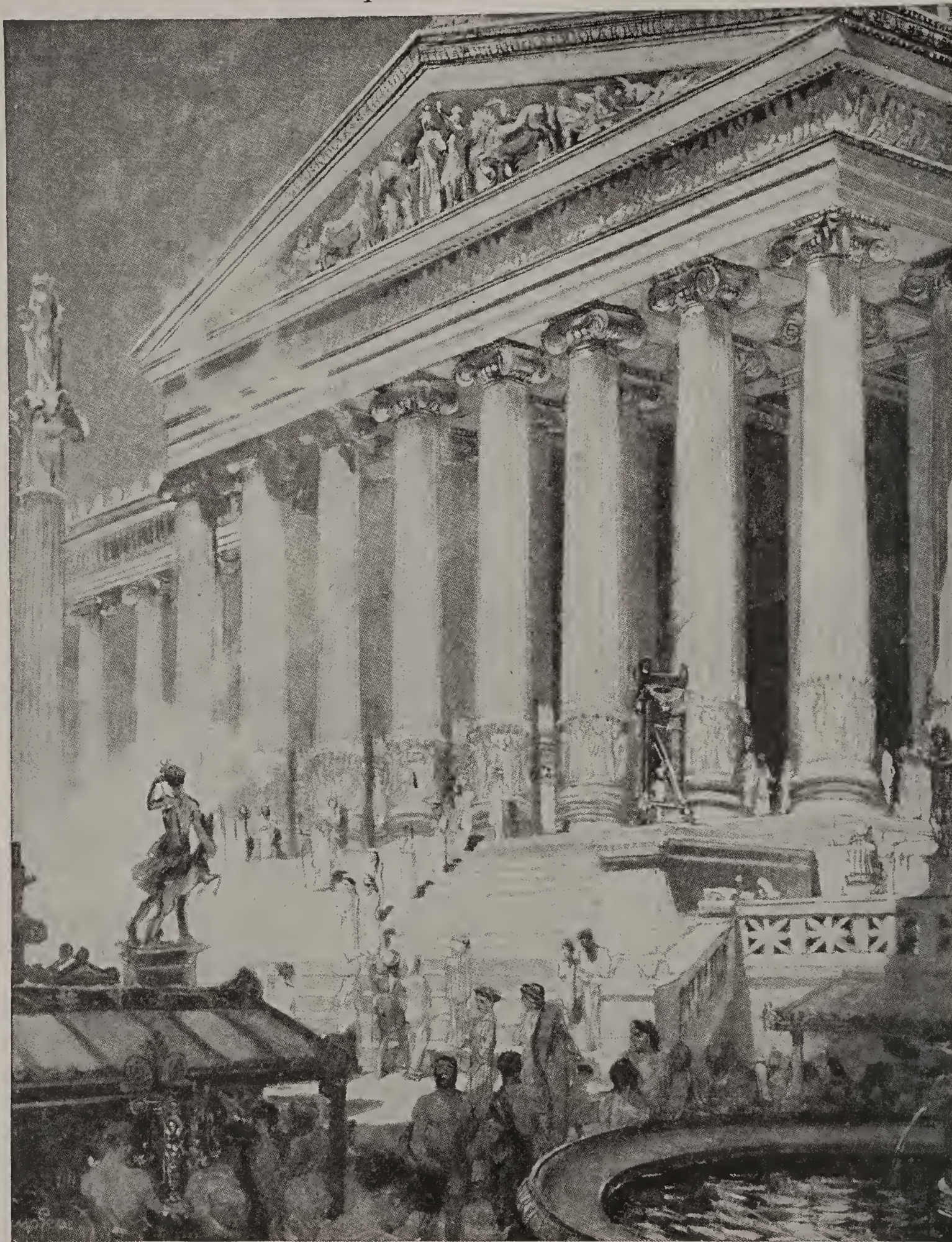
THE SEVEN WONDERS
and the Sphinx



and mummies were discovered by accident. One of them bore this inscription, "Osiris, King of the North and South, Men-Kau-ra, Living Forever, Thou Shalt Never More Have Enemies, O King of the North and South, Men-Kau-ra,

Living Forever." The Sphinx is thought to have been an open-air temple. It is built in the form of a lion with a man's head, and the shrine was between the huge paws. The people are walking toward it in the picture.

The Temple of Diana at Ephesus



THE picture shows you something of the magnificence and beauty of the Temple of Diana at Ephesus, the second wonder of the world. It was one of the most beautiful things produced by the artistic Greeks whose ideals of beauty are still the ideals of the world. Diana, the virgin goddess of the moon and the chase, was the patron goddess

of the Ephesians, and her shrine in the beautiful temple was visited by thousands of worshippers who left all sorts of valuable gifts, some of which have been found in the ruins. A small statue of the goddess with her favorite animal, the deer, stood facing the temple. You can see it at the left of the picture.

The Pharos of Alexandria



THE pharos, or lighthouse, of Alexandria, on an island at the mouth of the Nile, was built by one of the later Egyptian kings. It was a massive tower of white marble surrounded by a spiral staircase. A fire was kept burning continually at the top,

which guided vessels by its smoke during the day and by its light at night. The lighthouse and the land upon which it rested have both been weathered away by the waves and wind so that this ancient lighthouse lives only as a memory.

The Colossus of Rhodes



THE Colossus of Rhodes was a bronze statue of the sun-god, Helios, a hundred feet high. It stood at the entrance to the harbor of Rhodes in Asia Minor, as you see, with one arm outstretched to welcome navigators. At first it was believed that the

statue stood astride the harbor but this has been proved incorrect. Though overthrown by an earthquake in 200 B.C., it was considered so wonderful that the fragments were left where they fell for almost six hundred years.

The Great Statue of Jupiter at Olympia



THIS seated figure of Jupiter in the temple of Jupiter at Olympia, in Greece, was the work of one of the greatest of Greek sculptors, Phidias. The throne was of ivory, the mantle of gold, and the whole figure flashed with precious stones.

Like all the seven wonders, this statue of

Jupiter was a huge affair—for people were impressed with bigness just as they are today—but it had beauty to recommend it also. The face of the chief among the gods and ruler of the world expresses serenity, power, and majesty, as if he were indeed every inch a king.

The Hanging Gardens



THE city of Babylon was built on a dry and treeless plain. A certain king of Babylon married a princess from Media, a mountainous country

to the east. She pined for a sight of her native hills, so her husband built for her this terraced garden rising from the waters of the Euphrates.

THE SEVEN WONDERS
of Babylon



It was called a "hanging" garden, though the trees and flowers were really planted on a succession of stone terraces.

You will be surprised to learn that some remnant of these famous gardens remains to this day in the shape of a heap of ruins.

The Tomb of Mausolus, King of Caria



THE temple tomb of Mausolus built by his queen, Artemesia, was so famous that its name, *mausoleum*, got into everyday speech. By *mausoleum* we now mean any beautiful tomb or monument to the dead. The lion-guarded stairway leading up to

the building was one of its most striking features.

King Mausolus and his wife were rulers of the Kingdom of Caria in Asia Minor, and Halicarnassus, where the tomb was located, was the capital and chief city.

A Song of the Camp

*"Give us a song!" the soldiers cried,
The outer trenches guarding,
When the heated guns of the camp allied
Grew weary of bombarding.*

*The dark Redan, in silent scoff,
Lay grim and threatening under;
And the tawny mound of the Malakoff
No longer belched its thunder.*

*There was a pause. A guardsman said:
"We storm the forts to-morrow;
Sing while we may, another day
Will bring enough of sorrow."*

*They lay along the battery's side,
Below the smoking cannon;
Brave hearts from Severn and from Clyde,
And from the banks of Shannon.*

*They sang of love, and not of fame;
Forgot was Britain's glory;
Each heart recalled a different name,
But all sang "Annie Laurie."*

*Voice after voice caught up the song,
Until its tender passion,
Rose like an anthem, rich and strong—
Their battle-eve confession.*

*Dear girl, her name he dared not speak,
But, as the song grew louder,
Something upon the soldier's cheek
Washed off the stains of powder.*

*Beyond the darkening ocean burned
The bloody sunset's embers,
While the Crimean valleys learned
How English love remembers.*

*And once again a fire of hell
Rained on the Russian quarters,
With scream of shot and burst of shell,
And bellowing of the mortars!*

*And Irish Nora's eyes are dim
For a singer dumb and gory;
And English Mary mourns for him
Who sang of "Annie Laurie."*

*Sleep, soldiers! still in honoured rest
Your truth and valor wearing;
The bravest are the tenderest, —
The loving are the daring.*

BAYARD TAYLOR

GREAT WORKS OF ENGINEERING

SOME FAMOUS BRIDGES

Bridges and Bridge Building



Bridges That "Grow Wild"

YOU might almost think that bridges grew wild, to look at this one. It's a native bridge across a stream in the Philippine Islands; native, in two senses. The most important part of it is, the vines of the wild grape are found climbing up the trees in the woods of those Islands and the natives by carrying them across a stream and laying a platform with staves, make crude bridges similar in principle to those suspension bridges which were among the most notable triumphs of modern engineering.

In other words, you will see from the series of pictures which follow, that the great bridges of the world which represent the highest form of engineering skill are often merely primitive bridges on a large scale. The bridge across the Thames will remind you of a favorite game of childhood because it is called "London Bridge," (although there are other bridges) as its counterpart in the little old bridge of wood and stone is known as the "Iwakuni

Bridge" in Japan. The combination girder and arch bridge across Victoria Falls on the Zambesi River in South Africa, was started by throwing a cable across the stream as the Philippine bridge builders throw a vine across a stream to start such a bridge as that we see in the illustration. But, in bridge engineering, while it is comparatively easy to do a thing on a small scale, it becomes extremely difficult, and taxes the best trained brains when a similar thing is attempted on a large scale. In the case of the Zambesi bridge, for example, which crosses a vast gorge 200 feet deep, they first shot across a cord attached to a rocket. With the cord they hauled across a wire; then with the wire drew over a small cable. Then, running on this small cable, a truck with trolleys carried a still larger cable which held the two half arches together until they were firmly joined and riveted into the one arch that now spans the gorge.

SOME FAMOUS BRIDGES

Another Piece of Philippine Engineering



THIS is another example of native engineering in the Philippines. It shows a crude span bridge to connect a narrow pathway along the side of a mountain.

A Bridge That Floats on Boats



THIS is a famous bridge over the Oka River at Nizhni Novgorod, Russia, and employs a principle which has been used by armies in crossing streams from time immemorial—the support of the bridge platform on

boats. In India there are a number of such bridges over its great rivers. It is said that Alexander the Great crossed the Oxus with rafts made of the hide tents of the soldiers, filled with straw.

The Great Tower Bridge of the Thames



YOU will often see lift bridges that open up like the blades of a jackknife, but the famous Tower Bridge in London is unique in having that permanent footway at the top.

When the leaves of the bridge are down, foot travelers as well as vehicles use that passage way, but when the leaves are raised to let a boat through, foot passengers are carried to the upper roadway by what the English call "lifts" and what we call "ele-

vators." The great towers are not built entirely of stone as they seem to be, but are of steel, and the stone is simply the outer covering. The architecture is in the Gothic style. About 10,000 vehicles cross this bridge in a day and over 25,000 foot passengers.

The bridge gets its name from the two great towers, but it is also interesting to note that it crosses the Thames near the Tower of London. See that distant tower.

The Famous Brooklyn Suspension Bridge



HERE you see how a great American engineer, John A. Roebling, worked out the same problem which the Filipinos solved with the grape vines. Instead of using grape vines, he used steel cables of immense strength attached at either end to towers built for the purpose. You notice the roadway is suspended from the cables, as is the roadway that connects the two banks in our first picture. In the crude vine bridge you even see the vertical supports connecting the suspending vines with the platform, but while the roadway of the vine bridge bends down, the roadway of the Brooklyn bridge is almost straight, curving just a little upward. The Brooklyn bridge has roadways

for street cars as you see, as well as for foot passengers and vehicles. The cars of the elevated railroad also cross it. Half the time as you cross the Brooklyn bridge, you see men up among those web-like cables painting them. This is necessary to prevent the cables from rusting, as they are especially liable to do in the salty air from the ocean.

If you start at the New York end and walk to Brooklyn over this bridge, do you know how far you will have gone? Over a mile. Yet the length of the part of the bridge that crosses the water is only 1600 feet. The rest of the bridge length is devoted to the approaches which, as you can see from the picture, end at the towers.

Like a Bridge in Fairyland



THIS, as you can easily see, is a bridge in Japan. It is in one of the parks in Tokyo and consists of a single arch. Doesn't it look like a scene in fairyland?

London Bridge and Its Arches



THIS is the famous London Bridge. You see it is put together as if the builder had taken a number of those little humped-backed bridges of Japan, set them in a row resting on piers across a stream, and then built a straight roadway above them. The first London bridge was built in the twelfth

century and it had wooden houses and shops all the way across it. Do you see why? There were many people crossing all the time and the shrewd old English shopkeepers wanted to get the business. They lived upstairs in the houses and the shops were down below.

The Eads Bridge at St. Louis



THIS is the Eads bridge in St. Louis. When it was built in 1874 it was the talk of the engineering world, because it overcame difficulties that had never been successfully dealt with before. As the current is very swift here, when the river is high, it was necessary that the foundation should be very strong. So Captain Eads built his piers on rock by sinking caissons, or great hollow chambers, in which the men could work in laying the foundation. When you tip up a tumbler in a bowl of water you notice that the air prevents the water from coming up into it. The caisson works on somewhat the same principle, the water being forced out of

it by compressed air which is driven into the caisson by machinery. Inside the caisson are tubes reaching from the top to the working chamber at the bottom. In one of these tubes is a ladder by which the men go down. Another tube brings down needed material and takes up broken rock made by the digging. A third tube brings down air for the men to breathe.

The arches in the Eads bridge are made of great steel tubes. There is a double track for railroad trains—in the picture you can see one of these trains crossing the bridge—and above this are the passageways for vehicles and foot passengers.

A Bridge Like a Bookshelf

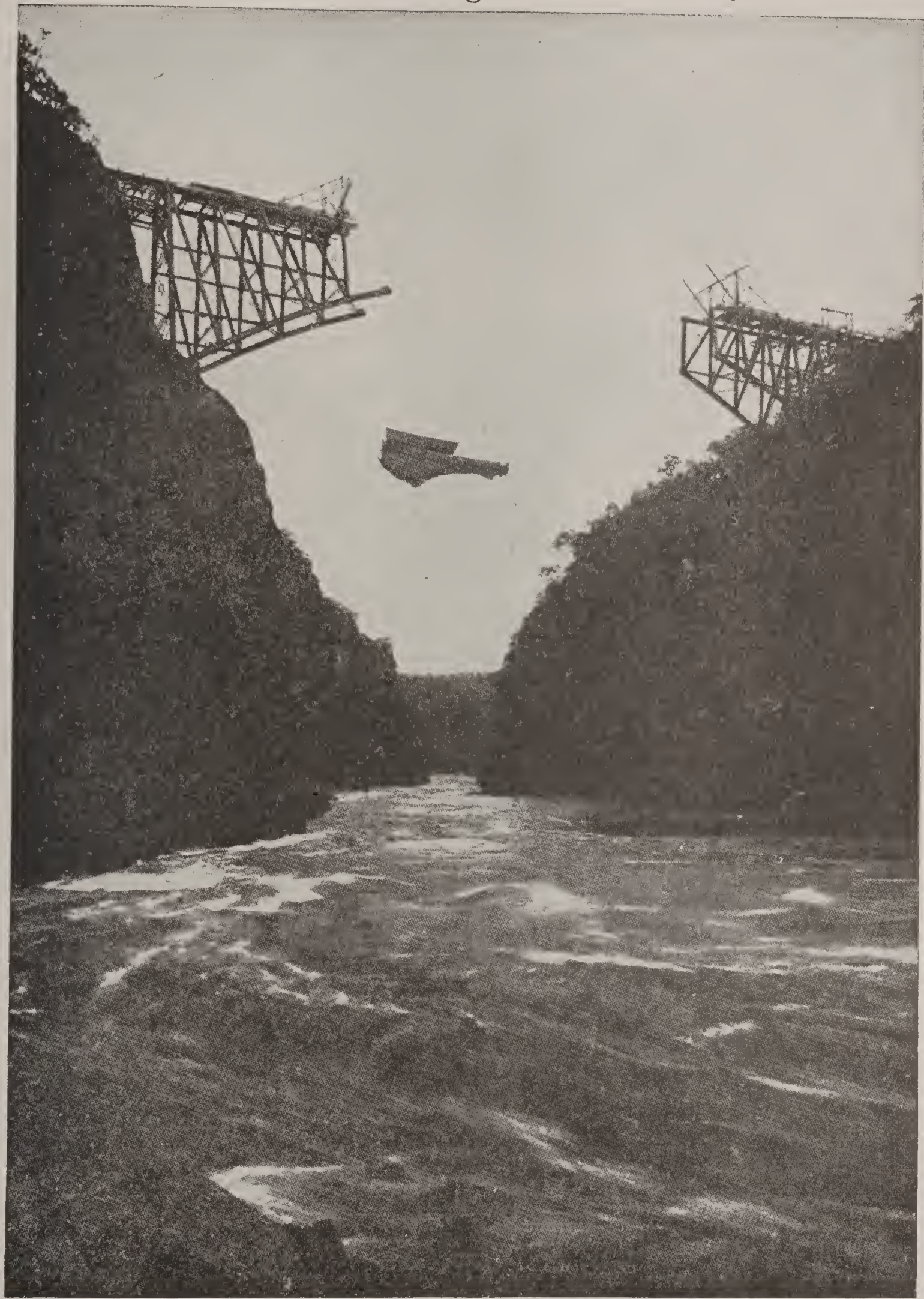


YOU know when you want a single row of books in a place where there is no room for a bookcase—just above the desk in a bedroom, for example—a very convenient shelf can be put up by screwing up brackets on the wall. A cantilever bridge is built on a similar principle. This picture shows the cantilever bridge over the river Forth in Scotland. The Forth bridge was designed by two English engineers. In the middle of the river is an island, and on each side of this island the water is so deep and swift it is impossible to sink piers. Accordingly, one pier was built on the island and two others near the shore. On these the cantilevers stand. Their great arms reach out over 1300 feet, leaving a space between them of 350 feet, which, as you can see, is connected

by another little bridge. The arches are very high. This is to enable vessels to pass under the bridge, which they do, even at high tide. After the English engineers had proven that this principle was practicable, it was applied to a number of other situations where it was necessary to cross wide spaces with few piers.

The difficult task of bridging the river Forth at the point where the structure we have been describing now stands, was begun by Sir Thomas Bouch who built a famous bridge over the Tay, another Scotch river. But one wild winter night a storm destroyed part of the Tay bridge and carried a train loaded with passengers into the river. Then Sir Thomas died of a broken heart and the present bridge was built by other engineers.

To Catch Falling Men and Tools



THE irregular shaped object, seemingly suspended in mid-air, is a net device to catch men or tools that might fall from the farthest points of the left side of the bridge,

on which the men are working. The distance is so great (the gorge is much wider than the impression of it given by this picture) that the supporting girders cannot be seen.

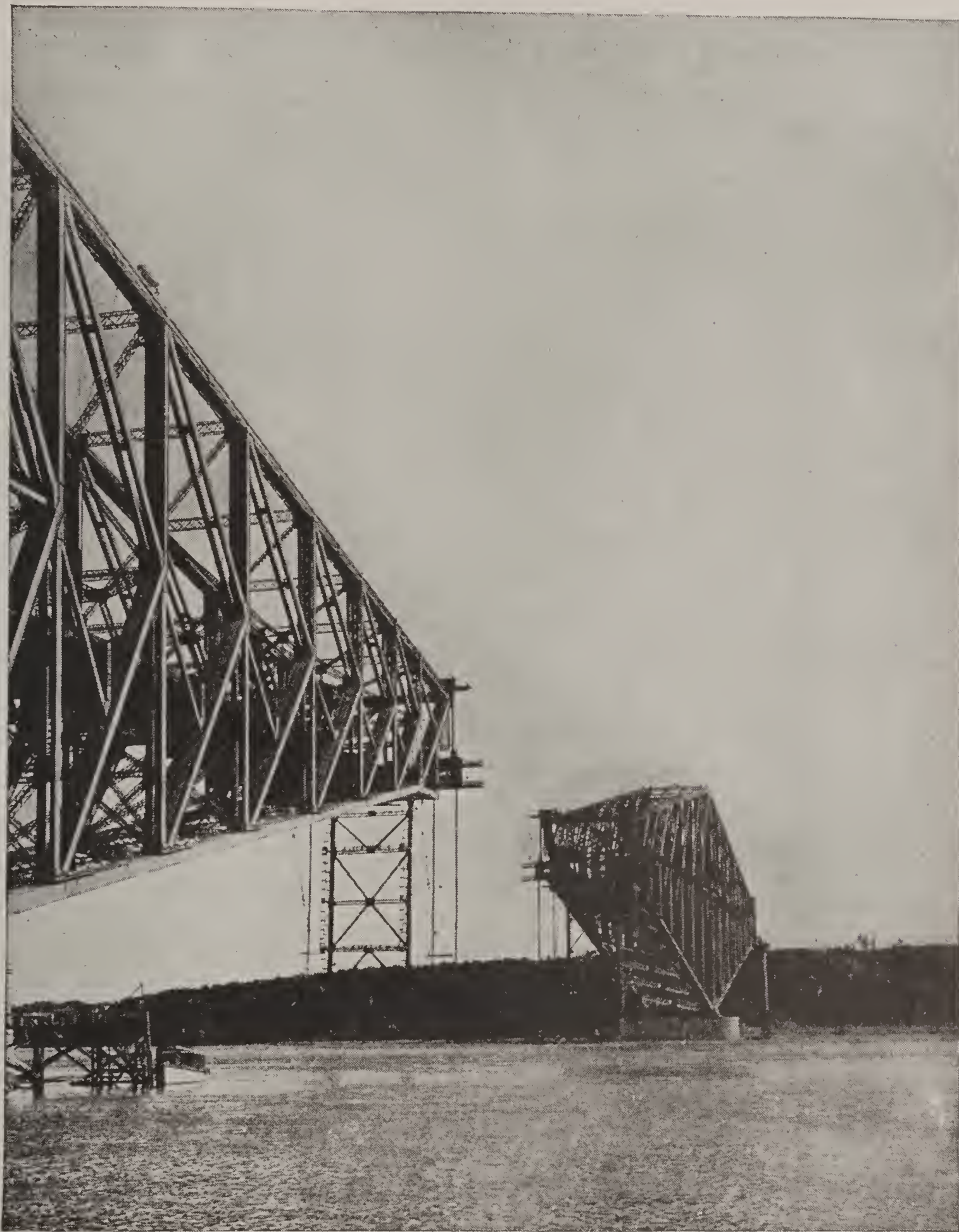
To Make Travel Safe for Others



VICTORIA Falls in the Zambesi River in Rhodesia, South Africa, is the greatest cataract in the world. A railroad bridge across it was completed in 1906, carrying out Cecil Rhodes' dream of a railroad uniting Cairo with Cape Town. The picture shows workmen, part of whom are English and part native, working 350 feet above the

roaring waters of the gorge. They are constantly wet with spray from the cataract. The parts of this bridge were made in England and shipped to Africa, but so careful are the calculations in modern engineering that the parts fitted each other and the distance they had to span within the half an inch left for adjustment.

The Cantilever Bridge at Quebec



HERE we are looking out across the St. Lawrence River during the building of the cantilever bridge at Quebec. These are the two shore spans to which the center span has been linked.

The uniting of the central link with the cantilevers is a very difficult engineering feat

and this bridge twice met with disaster; once when a cantilever fell during a storm and once when a connecting span turned over and fell into the river.

Of these bridges it may be said as is said of the states of our Union, "united they stand"; but, before, they are liable to fall.

How Some Boys Built



HERE are two boys who have become interested in the great and useful art of bridge building and they have just about completed a little cantilever bridge across a creek. This bridge is only 4 feet wide and the uprights or cantilevers, 7 feet high. The boys made the uprights or posts 4 inches thick and 8 inches

wide. The braces are 2 inches thick and 8 inches wide. The boys braced the bridge with wires which they twisted in cables and anchored to the trees. Any of our boy readers who wish to follow their example should see that the cables are anchored securely, as this is very important.

Now imagine a weight placed on this bridge.

a Cantilever Bridge

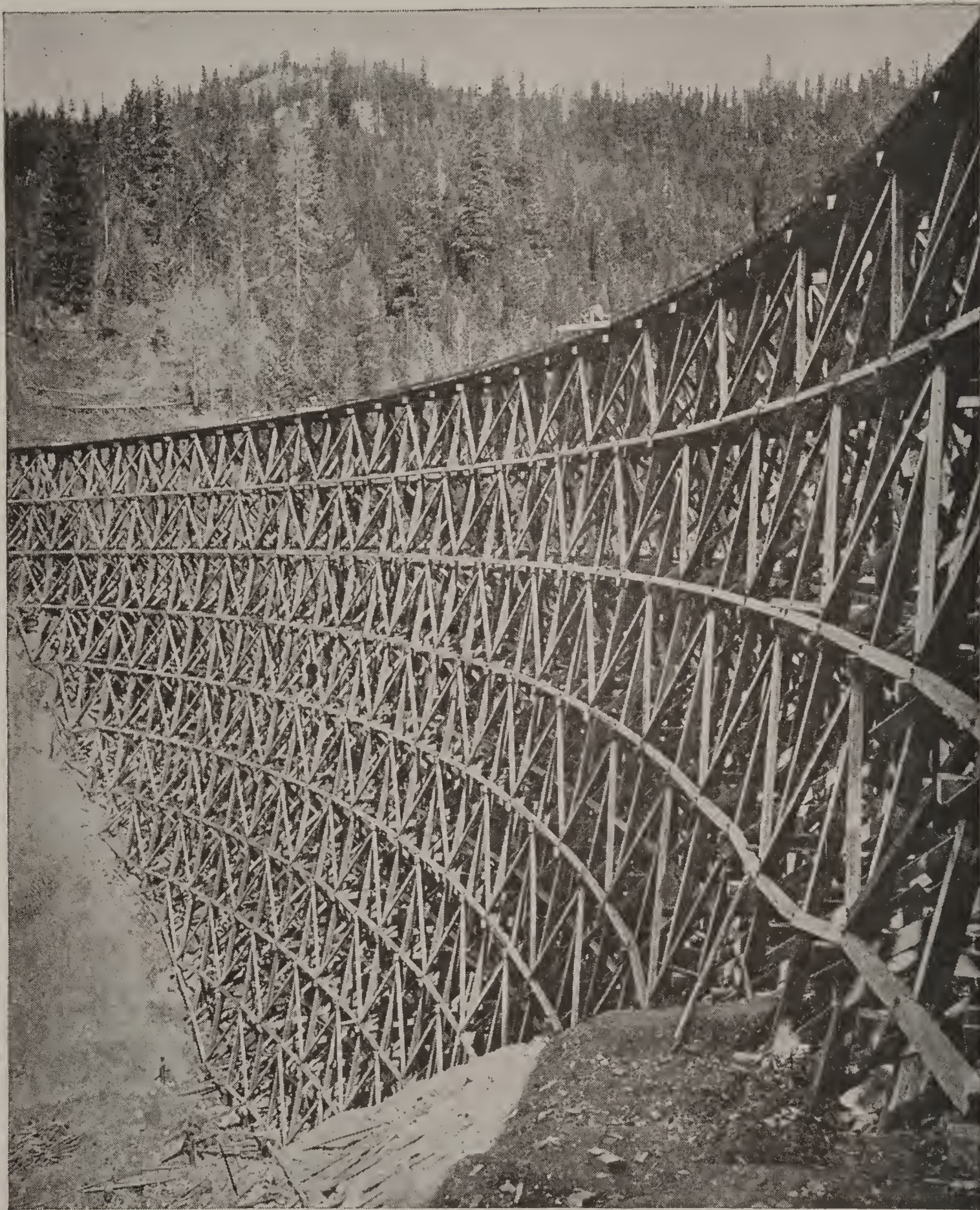


Notice that the weight is in the center. It is held by the cable which passes over the top of the post and to the tree. The heavier the weight the more the cable will pull, the harder the cantilever will push down on the foundation and the stronger the bridge becomes.

The boys made this for a foot bridge, but if

they had made it a little longer it could have been used for wagons. With what he has learned at Manual Training, any ambitious boy should be able to make a bridge just as good as this one, and it would be a good idea to put a railing from one cantilever to the other so there will be no danger of anyone falling off.

A Bridge on a Wooden Web



WHAT does this bridge remind you of? It looks to me, for all the world, like a spiderweb, it is so full of "criscrosses." And Mrs. Spider is a wonderful bridge builder, although she never has occasion to build railroad bridges. This picture shows a bridge across a dry ravine on the Canadian

and Western Railroad in Canada. It is built entirely of wood—with the exception of the bolts, of course, that hold the wooden supports together. Such bridges are built in timbered countries where the material is cheap. The greatest objection to them is that they are liable to catch fire.



MYTHS

Chosen from the Greek Classics
Retold in Picture and Story

*Paintings and Page Decorations Made Especially for
Pictured Knowledge*



The Laurel Tree



DAPHNE was Apollo's first love, and he longed to have her for his very own, but Daphne was a wood nymph and loved only her beloved forest, through which she would roam all day long. She did not want the love of this young god of the sun, and would not listen to his pleading words. One day Apollo spied her wandering here and there in the woods, and followed her. Poor Daphne saw him and ran away as fast as she could, for she did not want to talk with him. But soon growing tired, and seeing Apollo coming nearer and nearer, she called to her father, the river god, to open the earth and save her. Scarcely had she spoken the words when she felt a stiffness creeping over her, and just as Apollo came up, stretching out his arms to seize her, her father, the river god, turned her into a beautiful laurel tree. Apollo was so disappointed, for he loved Daphne with all his heart. Bowing his head in sorrow, he put his arms around the tree and kissed the bark and pressed the lovely glossy leaves to his lips; but the branches shrank at his touch, for Daphne did not love him. "Daphne, my beloved, since you cannot be my wife," he cried, "I will wear you for my crown. Your smooth, green leaves shall be woven into a beautiful wreath, and shall be worn to crown the heads of conquerors and of poets."

Have you ever seen a crown of laurel leaves? If not, when you do you will know that the leaves never wither, but are always green, and are made into a wreath to crown those who have done something noble and wonderful.

During the great European war the Princess Patricia of Connaught, known as the Princess Pat, who was honorary Colonel of The Princess Patricia's Canadian Light Infantry Regiment, placed laurel on the colors of this famous regiment, and so you see we still use the laurel leaf as a tribute.

The laurel wreath is also constantly used in art, to express honor toward some great poet, statesman, or national military hero.



The Hyacinth



POLLO, the god of the sun, was very fond of a handsome youth named Hyacinthus. They spent many happy hours together, sometimes fishing along the streams, often taking their dogs and spending the day hunting in the depths of the woods, and when tired with the day's sport they would rest under the shade of the trees and Apollo would play on his golden lyre and sing the songs they both loved so well.

Zephyrus, the god of the winds, was also a friend of Hyacinthus, but he was very jealous of his friendship for Apollo; in fact he did not even want Hyacinthus to have Apollo for a friend, for fear he would love the splendid god of the sun better than himself. Hyacinthus, not knowing how Zephyrus felt, had many friends whom he loved as well as Zephyrus, for he believed in being a good comrade to them all.

One day he and Apollo wandered off to spend the day together. They were playing quoits, and having such a happy time, when Zephyrus spied them. Being a jealous person he became very angry and called up his west wind, which caught the quoit as it left Apollo's hand, whirling it out of its course, and making it hit Hyacinthus with such force that he fell to the earth dying.

Poor Apollo thought he had caused the death of his friend. Crying bitterly, he lifted him in his arms and tried to staunch the blood flowing from the wound, but all in vain.

Laying him gently on the ground, he said,

"Thou diest, Hyacinthus, robbed of thy youth by me. Since I cannot die for thee, thou shalt live with me in memory and song. My lyre shall tell of thy fate and thou shalt become a beautiful, fragrant flower which will bloom in the spring;" and as Hyacinthus' blood dropped on the grass, a flower sprang up out of the ground which Apollo called Hyacinth after his dear friend and comrade, Hyacinthus. Every spring you will see this lovely flower blooming in the garden, and when you see it you will remember this story.



The Lotus Flower



ONCE upon a time many years ago there was a nymph, a beautiful sprite who lived in the woods. She was happy and gay so long as she could remain in her beloved forest. She knew all the trees and loved them. She knew where all the delicate wood flowers were hiding, and she knew where the little rippling brooks were to be found, the lake in the heart of the woods, and where the pond lilies were to be found lying out on top of the water, and also where the birds built their nests. She knew them all, and when the birds would call, she would answer. So dearly did she love the woods and all that belonged to it, that she had no time to think of admirers and of love, but unfortunately for the happiness of poor Lotis, she was loved by many youths who had seen her roaming in the woods where they had gone to hunt. In vain did they try to win her, for there was not one among them all that she found even interesting.

One day while resting in the woods she saw an admirer coming towards her. Lotis did not want to talk with him, so she jumped up and ran away, he basely pursuing her. As he gained on her she called upon the gods for help. They heard her pitiful prayer and just as she reached the brink of the lake which lay hidden in the heart of the wood, Lotis was turned into a lotus flower.

Have you ever seen this lovely flower? Sometimes it is purple and sometimes white, with its pale blue and pink tints, holding its head high above the large green leaves that lie so flat on top of the water? You will usually find it where the pond lilies live. This lovely flower grows in great abundance in Japan. No garden there is complete without it, but we, too, claim it as one of America's flowers, and this is how the lotus flower came to be.



The Lotus Tree



DRYOPE, with her little baby, was walking with her sister, Iola, one beautiful spring day, when the trees were in leaf and the flowers budding forth. Finally they came to a beautiful little stream with sloping banks. Right at the water's edge grew a glorious lotus plant just loaded with its purple flowers. Dryope, who loved flowers, stooped over to pick some of the lotus buds, when to her horror she saw blood dripping from the stems.

Frightened, she started to run away, followed by her sister, but Dryope could not move, for she was rooted fast to the ground and was turning into a lotus tree. Giving her baby to her sister, and holding her arms out pleadingly to her husband and her father who had come to find them, she said, "I am not guilty. I do not deserve this fate. I have injured no one. If I speak falsely let my foliage perish with drought and my trunk be cut down. Dear ones, take my baby and let it be brought up under the shade of my branches, and when he is old enough let him be taught to call me mother and say with sadness, 'My mother lies under this bark.' Tell him to be careful of river banks and beware how he plucks flowers, remembering that every flower he sees may be a goddess in disguise. Farewell, dear husband, sister, and father. Since I cannot stoop to you, climb up and kiss me and lift my child up so I may kiss him. You need not close my eyes, for the bark will all too soon cover me and close them without your aid."

And so poor Dryope was turned into a beautiful lotus tree, for she had angered the gods by plucking the little flowers lying on the edge of the water by the side of the lake. I am sure you remember the story of Lotis, who was turned into a lotus flower. Well, these very flowers that Dryope picked were none other than the lovely nymph, Lotis, in disguise. Poor Dryope, I feel so sorry for her, don't you? For she really was not to blame and did not wish to anger the gods who treated her so cruelly.



The Anemone



HE goddess Venus fell in love with a youth, called Adonis, who lived on our earth and was a great hunter. So dearly did Venus love him that she left her home up in the sky above, to join him on earth below. Every day they would call their dogs and go out into the woods to hunt deer and hares—keeping away from the dangerous animals, for Venus was afraid of them and begged Adonis to leave these fierce creatures alone. She knew only too well how he liked to hunt them and she was afraid he might be killed if she was not there to protect him.

One morning, not being able to be with him, for she had to return to her home in the skies for a few hours, she cautioned Adonis to be careful and not give chase to these fierce, wild beasts that roamed their forest. So saying goodbye, she called for her beautiful chariot drawn by white swans, and mounted into the air and disappeared.

To the woods went Adonis. His dogs roused a wild boar, and, forgetting so soon his promise to Venus, he gave chase and struck the boar with his spear. Suddenly the beast, dripping with blood, turned and buried his tusks in the hunter's side. Venus, in her chariot flying through the air, heard the dying groans of her beloved Adonis. Turning quickly around she hurried back, only to find him dead. Lifting him in her arms and crying over him she said, "Beloved, you shall never be forgotten, for your blood, as it drops to the ground, shall be changed into a flower," and as she spoke these words, a frail, sensitive flower sprang up which blooms but for a short time. The wind gently blows open the buds, afterwards carrying the petals away; so it is called "anemone," or the wind flower, which is so delicate and beautiful.

You will realize how much these myth stories really meant to the people who originally told them, when you know that it is now agreed that it represents the mystery of vegetable growth; the coming to life again of tree and flower.





The Oak and Linden



ONCE upon a time Jupiter, and his son Mercury, disguised themselves and began making calls on mortals as two penniless strangers, to see how they would be treated. One night these strangers came to a little white cottage which stood on a hill, and asked for shelter, saying they had begged others to take them in, only to be turned rudely away. Philemon and Baucis, feeling sorry for them, opened wide the door and said, "Come right in." Baucis gave them some dinner, adding a pitcher of wine. As the strangers emptied the pitcher, Philemon and his wife saw it fill to the top again with the same red wine, so these simple, honest people were sore afraid, as they knew their guests were gods in disguise. Fearing they had not had enough to eat, Baucis said she would kill her old goose and prepare it for them. As she was leaving to do so, one of the gods said, "You have been so thoughtful and kind where others have turned us away, you shall be rewarded and these rude people shall be punished."

Hastening after them they came to a high hill. In the valley below rose a great lake, in which all the houses had been swallowed and their neighbors drowned. Looking for the little home on the opposite hill, they saw a beautiful temple standing where their little cottage had been. The gods made Philemon and Baucis the guardians of this wonderful temple, and they lived there many years. Before returning to their homes, the gods said any request Philemon and Baucis asked would be granted them. They both replied that their one wish had been that they could die at the same time, for they could not bear to be separated.

One day while telling the story of the temple to some travelers, for many came from all parts of the world to see this beautiful Greek shrine, they were turned into an oak tree and a linden tree. Mythology does not tell us which one is Philemon and which one is Baucis, but I think the sturdy old oak is Philemon and the graceful linden is Baucis.



The Larkspur



ONCE there was a strong and brave youth, Achilles, who went to the temple of Apollo to arrange for his marriage with the beautiful Polyxena. While in the temple he was killed by his friend, Paris, who shot him in the heel with a poisoned arrow, because he was jealous of Achilles, as he was a great hero of many wars, and then too, he did not want him to marry the lovely daughter of King Priam. We are told when Achilles was a baby his mother dipped him into the River Styx, for the belief was that whosoever bathed in this river could not be hurt by javelins, daggers or arrows or any instrument of war. So his mother thought no ill would ever befall her beloved son; but unfortunately the water did not touch the heel by which she held him, so this was the only spot where he could be hurt. Paris knew this, so he aimed well and shot his arrow into Achilles' heel, thus killing him. After the burial of Achilles, his mother wished to give her son's wonderful suit of armor to either Ajax or Ulysses, Achilles' two best friends, so she selected a number of judges to decide to whom it should be given, for this she could not do. It was given to Ulysses, who was made very happy, but poor Ajax was so disappointed that he killed himself. As he died, the gods, feeling sorry for him, turned the drops of blood as they sank into the ground into a lovely flower that grows on a long stem and called it Ajax's larkspur, in memory of this unhappy boy. When you see "the larkspur" which blooms during the hot days of summer you will notice that sometimes it is deep pink and pale pink, and deep blue and pale blue. The shading of the deep pink into a light pink, and the deep color blue to a pale blue is very beautiful. When summer comes, and you see the larkspur in bloom you will remember this story, I know.

The larkspurs get their name from the fact that the upper leaf of the little green cup that holds the flower is longer than the others, and so looks like a lark's spur.



The Poplar Tree



PHAETON and his three sisters were made very unhappy by their school friends because they would not believe that Apollo, the god of the sun, was their father, so one day Phaeton, saying goodbye to his friends, journeyed to the sun, and there on the throne, amid a blaze of light, sat the great god, Apollo. Shielding his eyes from the light, which almost blinded him, he knelt before the throne, and looked at his father saying: "Tell me, O light of the boundless world, are you my father?" "Yes, my son," answered Apollo, "I am indeed your father, and to prove that this is so, any wish you may make I will grant." At that moment Phaeton heard the stamping and neighing of horses. Turning in the direction from which the sound came, he saw his father's chariot. He asked if he could for one day drive the chariot around the sun. Apollo was very sad, for he knew no one but himself could hold his wild horses; but as he had promised he said "Yes."

Alas, poor Phaeton could not hold these fiery steeds and they ran away, throwing him out so that he fell into a river on the earth below and was killed. They tore down so close to the earth that the sea began to boil and Neptune, god of the wide waters, came up to see what in the world was the matter, but had to dive three times to keep from being scorched.

The three little sisters were so unhappy over the sad fate of their beloved brother that they would go every day to the river's edge and cry their hearts out, praying to the gods to be kind and give their brother back to them. One day they never came back, for they were turned into three lovely, straight, poplar trees which sprang up at the water's edge. Nothing is more beautiful than a poplar tree, so straight and graceful do they grow, with their branches raised high toward heaven, just as if the little sisters were lifting their arms begging Apollo to give them back their brother. Have you ever seen this graceful tree?



The Sunflower



HERE is another story about Apollo, but this time it is really of Clytie, a beautiful water nymph who fell hopelessly in love with Apollo, who you will remember was the god of the sun, and the father of the luckless Phaeton and the three sisters who were turned into poplars.

You will say, I know, that Apollo was quite right in not wanting the love of Clytie, the beautiful water nymph who was so hopelessly and foolishly in love with him.

As I said, Clytie was a water nymph, who could live in the water and on the land as well. She was very beautiful with her wonderful hair that shone like spun gold in the sunlight. So dearly did this unhappy girl love the handsome Apollo, that for nine long days she sat on the cold ground with her lovely hair hanging over her shoulders. All day long she would hold her arms out pleadingly to Apollo, begging him to love her as much as she loved him. Now Apollo had told Clytie that he could not love her and he begged her to go away and forget him; but no, she would not listen to reason.

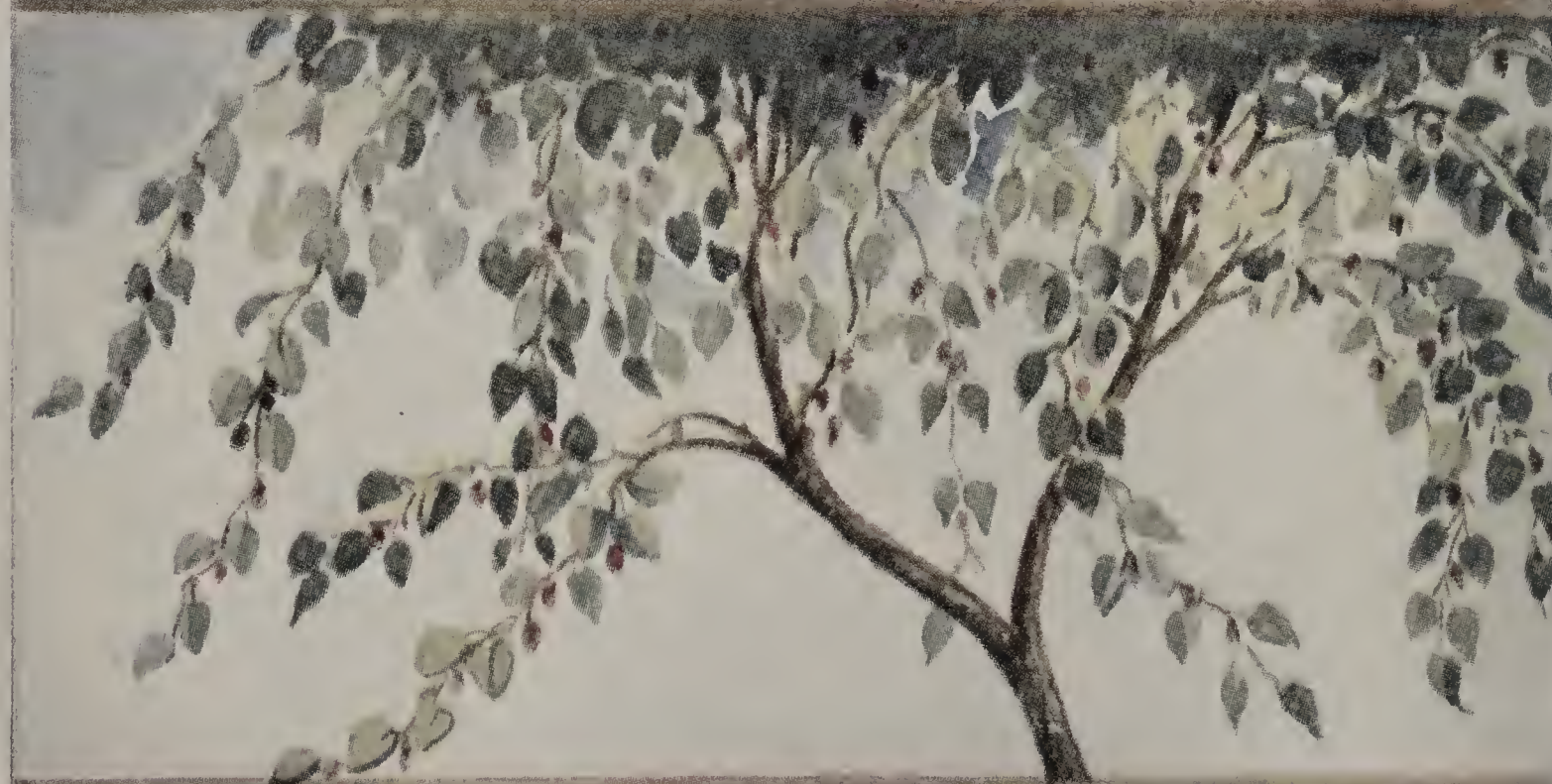
Nothing would she eat or drink, for only would she gaze at the sun. Apollo became very angry, so in order to rid himself of her, he turned Clytie into a sunflower.

I know you have seen this tall, stately flower, with its yellow petals, which must be Clytie's wonderful golden hair, for they look just like the rays of the sun.

Although Apollo turned Clytie into a sunflower, he could not lose her devotion, for even today the sunflower worships the sun, for it turns on its long stem and watches the sun rise in the East in the morning, slowly turning all day, when in the evening facing West, it watches the sun set, until it disappears, just as Clytie used to do.

Whenever I see a sunflower I always think of poor, unfortunate Clytie and feel sorry for her, don't you?

By "sunflower" the Greeks are supposed to have meant the marigold. They could not have meant the sunflowers we know, for these are natives of America.



The Mulberry Tree



PYRAMUS lived next door to Thisbe, whom he loved. Their parents would not consent to their marriage, so poor Thisbe and Pyramus were kept apart. In their anger the mothers and fathers built a high wall between the two homes; One night, through a hole in the wall, Pyramus asked Thisbe to meet him out in a large open field where stood a beautiful, white mulberry tree beside a cool, clear spring. The next night Thisbe stole quietly away from home and waited under the tree, knowing Pyramus would soon join her. Hearing a step, she looked up to greet her lover, when she saw a lioness coming toward the spring. She jumped up and ran behind a rock to hide, dropping her veil on the way. The lioness, seeing the veil on the ground, picked it up in her bloody mouth and tore it to pieces. After drinking at the spring, the beast returned to the woods, leaving the torn and stained veil on the ground.

Pyramus being late ran up to the mulberry tree to meet Thisbe, but all he found was the bloody veil. Crying, he caught it to him and said, "Oh, dear girl, my Thisbe, I am the cause of your death. I cannot live without you. I will die too." So saying he stabbed himself with his hunting knife and fell down under the tree, the red blood flowing into the ground at its roots.

Thisbe, trembling with fear, left the rock and started back to their meeting place. Coming nearer she saw the white berries were turning red. Eager to tell Pyramus she had escaped being killed by the lioness, she hurried forward, only to find him dead.

"Pyramus, my beloved," she cried, "you died for my sake. I, too, cannot live without you. I die by my own hand so that I may live again with you." As her blood dyed the ground, the white berries that were turning red became a deep purple, and, so today, we have a purple mulberry, as well as the white mulberry tree on which the silk worms of China and Japan get their food.



The Spider



RACHNE was an industrious and beautiful maiden whose embroidery was wonderful to all her friends. Not only marvelous in design, but the way it was done was a delight to those who saw her busy fingers weave her pictures.

Minerva, the goddess of wisdom, looked down from her throne and watched with interest the competition for a prize which Arachne and her friends were hoping to win. As usual, Arachne was victorious. Minerva was happy over her success and admired her beautiful work more than ever, for she herself was an expert in the art of weaving. But alas, so much praise had this clever girl that her head was completely turned, and she even went so far as to deny that she was the pupil of the great goddess, saying: "If Minerva thinks she can do better work than I, let her descend to earth and try her skill against mine."

Minerva heard her words and came down to earth disguised as an old woman. Going to Arachne she said, "I hear, my dear, that you have challenged Minerva to compete with you. I would ask, if I were you, to be forgiven for being so rude."

"Keep your own counsel, old woman," she replied. "I know what I am saying and I'll not ask her pardon, for I am sure my work is far better than hers."

Dropping her mantle, Minerva stood before her, having changed from the old woman into the goddess. The spinning wheels were brought and they both sat down to weave their pictures. Finally the work was done. Minerva's piece was judged more wonderful than the skilful maiden's, who, when defeated, was very impudent. So rude was she that Minerva, who had tried to be kind, became angry, and with her shuttle struck this wayward girl's work, tearing it to pieces.

Poor Arachne was so unhappy that she hanged herself. Minerva, seeing her lifeless body hanging to a tree, turned her into the spider, spinner of beautiful webs.



The Heifer



HIS is another story about Juno and Jupiter and of how badly they treated the beautiful nymph Io. One day while Jupiter was talking to this lovely sprite, she was turned into a heifer, for Jupiter was afraid Juno, his wife, whom he saw coming toward them, would hurt her, for Juno, as you know, was very jealous. The Queen of the gods suspected what her husband had done, so, calling to the glossy little calf, she asked Jupiter to give the beautiful creature to her. Poor Jupiter was afraid to say no, so Juno took her away. Each day she would treat her cruelly, until Jupiter was in despair and would beg Juno to be more kind to the poor little heifer, who always looked at him so pleadingly with its big sad eyes.

Juno would not listen to his entreaties, until finally Jupiter sought the aid of his good friend Mercury, to help rescue the lovely nymph. Juno, fearing the justice of the god Mercury, called a horrid gadfly and told it to bite and sting poor Io and chase her away, so they would never see her again. This the gadfly did until she could stand it no longer; so she ran away, the gadfly pursuing until they came to a big sea, into which the little heifer leapt and swam to the opposite shore. Since that time this sea has been called the Ionian Sea, after Io.

After many months of pleading, Juno said that Jupiter could turn the little heifer back into beautiful Io if he would promise to send her home to her father. So one day this dear little nymph became herself again. She was so happy that she ran and jumped, but was afraid to speak for fear she would low as the little calves do; but slowly she regained her confidence and laughed and spoke aloud. Then she returned home to her sorrowing father, who was so glad to have his lovely daughter free from the cruel curse the gods had put upon her.



The Lion and Lioness



TALANTA was a young girl who liked to run races and play games. As she grew older the oracle which she had consulted advised her not to marry, for it said if she did she would be unhappy. To all her suiters, therefore, Atalanta turned a deaf ear. Finally they became so ardent that in despair she said, "I will marry the man who can conquer me in a race, but those who fail to win must die."

In spite of this cruel decision many entered, hoping to win the fair Atalanta. Hippomenes, who was to have been the judge, laughed and said the men were foolish to risk death.

When at last Atalanta came out on the track ready for the race, Hippomenes fell in love with her beauty, and instead of judging as he intended doing, became one of the suitors for the girl's hand and heart. His friends begged him not to throw his life away, for they said, "None can outrun this wonderful girl"; but Hippomenes prayed to the goddess Venus to help him in his venture. Venus heard his prayer and sent him three golden apples from the trees in her garden and told him to use them as she directed. The race started. He and Atalanta ran ahead of the others, Hippomenes a little in the lead; but soon he became tired, and as Atalanta came up to him, ready to pass, he dropped one of the golden apples. She, seeing how beautiful it was, stopped to pick it up, then Hippomenes darted ahead; but soon she was even with him again, so he dropped the second apple, as Venus had told him to do, which the lovely girl could not resist. Just as the race was nearing the close, Atalanta was ready to pass him again when he dropped the third apple. As she stooped to pick it up, Hippomenes darted ahead and won the race, as well as his beloved Atalanta. They were so happy that they forgot to offer a prayer of thanks to Venus, who did not like their neglect. So in her anger she caused them to be turned into a lion and lioness.

Poor Hippomenes and Atalanta!



The Halcyon Birds



ONE beautiful day King Ceyx of Thessaly ordered his vessel taken from its moorings and put in order for a trip across the sea. He wanted to consult the oracle of Apollo, for he feared he had angered the gods, as his beloved brother had died but a few days before, and he was most unhappy over his loss. Halcyone, his wife, was distressed over this venture, for she said evil would befall her lord, and she begged him not to go; but if he must do so, to take her along. King Ceyx knew the way was dangerous and as much as he wanted Halcyone to accompany him, he dared not risk her life, so he sailed away alone.

One stormy night with lightning streaking the sky, and the wind and waves raging high, the vessel was struck and all on board were thrown into the sea. Grasping a plank, the king floated away on top of the water. His thoughts were with his beloved Halcyone, and he cried her name aloud in his distress.

Halcyone was at home and asleep, but the gods, knowing of King Ceyx' helplessness, brought the truth to her through a dream. Jumping out of bed, she ran to the edge of the sea, tears streaming down her face. Suddenly she saw her husband's lifeless form way out in the ocean, the waves bringing it nearer and nearer. Just as she started to jump on a rock which stood out in the deep water, she felt herself being lifted into the air. The gods who felt pity for her had turned her into a beautiful bird—a halcyon bird. Quickly she used her wings, flying out over the water to her beloved. Kissing him with her beak she cried, begging him to open his eyes and look at her. The kind gods willed King Ceyx to lift his head, and as he rose from the water his body was changed into the form of a bird; and so they flew away to the woods at the edge of the sea and there they made their home. The gods called them the halcyon birds and we call them today, kingfishers.



The Frogs



THE goddess Latona had roused the anger of Juno, the queen of the gods, who was jealous and angry with her. Juno, being stronger and mightier than Latona, drove her out into the world. This poor goddess wandered over the mountains and through the plains, carrying her twin babies in her arms. Looking for water to quench her thirst, she saw a spring lying below in the valley. Reaching the spring she laid her babies on the grass and leaned over to drink of the cool, sparkling water, when the country people working in the fields pulled her back, saying, "Stop, stranger, you cannot drink of that water."

Latona was so tired and thirsty that she begged them not to refuse her. "I do not want to bathe in it," she said, "I only wish to quench my thirst. I beg of you to give me a drink of water," she cried, "for my mouth is so hot and dry I can scarcely speak." The little children stretched out their arms as if to plead for their mother, but all in vain, for the foolish rustics were stupid and unkind. They laughed and jeered at Latona and called her names. Not listening to them, she leaned over the spring to take a drink, whereupon these country people ran into the water and stamped with their feet, making it so muddy that no one could drink of it. Then they called to her and said, "Drink now of the dirty water if you are so thirsty." This unhappy goddess became so angry that she forgot all about her thirst. Calling upon the gods to revenge her she said, "May they never come out of that pool alive, but pass the rest of their lives there." The gods heard her prayer and caused the water to rise and drown the rustics. Then they turned them into frogs, whose voices are harsh and disagreeable, just as their voices had been when they were jeering poor Latona; and so today the world has thousands of muddy pools filled with frogs, and this is how the frogs came to be. But nature lovers who make a study of frogs will tell you that several kinds sing very pretty little tunes.



The Swan

THE story of Phaëton and his three unhappy little sisters, who were turned into poplar trees, you know; but I did not tell you of his devoted companion, Cygnus, who, after Phaëton fell in the river, went every day with the little sisters to help them search for the dear lost brother and friend.

Even after the sisters were turned into poplar trees, Cygnus would go all alone to the river bank, sometimes diving into the water, hoping to find his lost comrade; but all in vain, for the gods became angry with him and turned him into a beautiful, white swan.

You doubtless have seen a swan, swimming on top of a pond or lake, suddenly duck his head under water as if looking for something. If so, you will be glad to know that poor Cygnus, Phaëton's friend, was just as stately and graceful as the swan you saw.

Secrets of the Magician



Quite aside from its educational value, an interest in tricks and magic has an important bearing on the child's attitude toward both home and school. If we do not want our boys to employ themselves in idle or vicious amusements outside the home, we must provide them, or help them to provide themselves, with the right sort of amusements in the home.

And, while primarily, from the standpoint of the boy and girl, solely a means of entertainment, this Department has high educational value. The study of tricks and "magic" sharpens observation and develops mental alertness. As in the history of the race, Chemistry began with Alchemy, Astronomy with Astrology, so the child's mind is led through a similar process out of the tricks of magic to the greater wonders of modern science and to the acquirement of manual skill of practical value.

YOU are going to the theater tonight! There you will see a "magician" perform the wonderful tricks with which he has puzzled and entertained people everywhere. When you arrive the theater is almost full and people are chatting pleasantly, listening to the orchestra or reading their programs. This is all very interesting, but you do wish that the curtain would hurry and rise. There, the lights go out, the music changes, and a "thrilly" feeling makes you sit up straight and open your eyes wide. Up rolls the curtain and you see a dimly

lighted stage, set with gorgeous curtains, queer little tables and stands, screens, and curious boxes. An elegant gentleman with sharp eyes and deft hands comes forward.

It's the magician!

The Clever Gentleman in the Dress Suit

He wears a dress suit and probably has a black mustache and a goatee. His hair is brushed up at the sides to look something like horns—no doubt in resemblance to a very clever but very wicked person whom you know in Goethe's "Faust" as "Mephistopheles." He

The Clever Gentleman in the Dress Suit



Here you meet face to face the clever gentleman in the dress suit just as he appears when the curtain goes up and you take the first tight hold of your breath. The magician! You see he has on the dress suit and wears a black mustache and goatee just as we said. He decided, however, not to brush his hair up at the side to look like horns as so many magicians do.

may modestly refer to his performances before "delighted audiences, including the crowned heads of Europe," and allude learnedly to the ancient days when magicians

professed to turn the laws of nature upside down and inside out. He himself makes no pretense to association with familiar spirits, as they did, nor to any ability to violate

nature's laws. He proposes to give a very scientific and instructive exhibition which will be equivalent to a course in Physics, Chemistry and other branches of Natural Philosophy, and demonstrate how much quicker is the human hand than the human eye—particularly if the human eye is looking at the wrong place.

"This is ink," he says, showing you an ordinary goblet apparently half full of the blackest of black liquids. But you are on your guard and resolved to catch him if you can.

"Just to prove that it is ink, we'll dip this white card into it," says the gentleman, and sure enough, the card comes out as black as coal.

"Well, maybe it really is ink," you say to yourself. "The trick comes in some other way."

"If you still doubt it, how about this?" and he dips up a spoonful of black fluid and pours it into a saucer, passing it around for the audience to examine.

"Now, we'll see what we can find in the ink," says the magician, whipping out a white silk handkerchief and slipping it carefully over the goblet of ink. How "creepily" his hands move, you think; they seem to glide through the air. Again you resolve to watch very closely because this wizard is so clever—he talks and moves so quickly

that you are a little bewildered.

He makes some mysterious passes above the glass, slips the handkerchief carefully off, and, lo!—no inky-black liquid is to be seen. The water

is as clear as crystal!

How did he do it?

Just as easy! You can do it, too, if you will practice long enough and learn to use your hands as swiftly and cleverly as does the smiling gentleman on the stage.

Secret of the Glass of Ink

To begin with there wasn't any ink in the glass at all. The magician, by one of his tricks, just made it look that way. A piece of black rubber

cloth, cut to fit the glass, lined the inside so that it seemed to you to be full of ink. A black thread with a cork attached to the end was fastened to the rubber cloth and the cork was left hanging over the edge of the glass where you couldn't see it. Look at the picture. The white card which seemed to be blackened by the ink was really white only on one side. It was black on the other. The magician showed the white side to you the first time, but deftly turned it over in pulling it out of the glass, so that you saw the black side. The spoon with which he dipped up some of the "ink" and poured it into the saucer con-

Look What He Did to the Card!



Here is the nice white card just after it has been dipped in the glass of ink. Could anybody doubt it was ink?

*Black
But Wasn't
Ink*

tained a few grains of aniline black. Water dissolves this substance very easily, and by the time he poured the water into the saucer it was as black as real ink. In "changing" the ink into water he was careful to pull the cork up with the handkerchief, and, of course, the black rubber cloth came, too, hidden in the folds of the handkerchief.

A Dye That Acts Like Magic

Here is another color-changing trick that always puzzles the audience. It is done with four handkerchiefs, two of one color and two of another, but all of the same size. The rest of your equipment is a sheet of stiff white paper nine inches square and a four-inch length of pasteboard mailing tube about one and one-half inches in diameter. Sewed within the tube, as shown, is a black linen bag that reaches the end of the tube. One of the handkerchiefs, you see, is sewed to the center of the bottom of this bag. The sheet of paper is marked by a dotted line to show how far it should be rolled so the pasteboard tube will slip into it easily. A rubber band around the sheet keeps it from unrolling. The handkerchief fastened to the bag must be pressed into the tube, and next it is placed the other handkerchief of the same color. Both should be pressed as far back into the tube as the bag will

permit so that they will be entirely concealed.

One of the remaining handkerchiefs is opened and placed upon a table, the loaded tube laid upon it with the empty end toward the rear, and over the tube, so as to screen it from the spectators, the fourth handkerchief is carelessly thrown. To enable the performer to readily locate the tube, its empty end is left exposed to his view so that he can grasp it off-hand in taking up the handkerchiefs.

In presenting the trick the performer shows the white sheet of paper, then standing in full view of the audience he

It's Empty As You See rolls it in to a tube of the

proper size as determined by the pencil mark upon it, slips

the elastic rubber band around, and passing his wand through, shows the tube empty.

He now steps to the table with the paper tube in his left hand, grasps the pasteboard tube and the exposed handkerchiefs in his right hand, holding the pasteboard tube so that it is well concealed both by his hand and the handkerchiefs around it, and then slowly proceeds to insert the handkerchiefs into that end of the paper tube held towards the audience. Under cover of doing so, he first inserts the pasteboard tube, and as soon as it is well inside, tightens his grip

After the Handkerchief Has Changed Color



This shows the magician pulling the handkerchief out of the magic tube after the magic dye has done its work.

on it by pressing more tightly upon the paper tube with the thumb and fingers of his left hand; then, remarking that it would perhaps be easier and the spectators would probably be better able to follow his movements if the handkerchiefs were inserted separately, he pulls them out again and inserts them one by one, using his wand to pick them up and to poke them in.

While doing this he explains to the audience that the passage of the handkerchiefs through the paper tube changes their color; in other words, that the tube acts as a dyeing device. When one of the concealed handkerchiefs has been forced partly out of the end of the paper tube by the insertion of the exposed handkerchief and wand into the other end, the performer grasps it with his right hand and draws it entirely out, holding it up so that the spectators can see both sides.

After the second exposed handkerchief has been entirely pushed in by the wand and the second concealed handkerchief appears at the opposite end, he draws this out also, but pulls it slowly, allowing its edges to fall around the paper tube. Then grasping it near the center he brings it entirely out, and with it the pasteboard tube into which the original handkerchiefs have been pressed, but allows the edges of the now exposed handkerchief to conceal the tube from the spectators. After this handkerchief has been held up so that the audience can see it, it is placed upon the other handkerchief on the table, care being taken to keep the pasteboard tube well enclosed within its folds.

The paper tube may now be unrolled before the spectators and shown empty, or left rolled and tossed to the audience for examination.

Hypnotizing a Table

The magician's next trick is as wonderful as the first. He tells the audience he is going to magnetize one of the little tables on the stage.

"By simply passing my hands over it a few times, I can make it obey my will and follow my hands anywhere."

First, he turns the table, which is light and easily handled, around and upside down and passes his wand completely around it, to show you that it has no wire connections. Then he waves both hands above the table, and declares it to be completely mesmerized. He rests both hands lightly on the table top, the right one in the middle. Then he raises both hands slowly, and sure enough, up comes the table! He withdraws his hand, still the table follows wherever the right hand leads. Then with a quick swing he makes it circle above his head. It is made to perform several other acrobatic feats, and at length, with both the magician's hands resting on its top, it comes to rest on the floor. He quickly takes his hands away and bows smiling to you over the footlights.

Was the table really magnetized? No, indeed! You didn't notice the small gold ring on the magician's middle finger, nor the wire nail projecting from the middle of the table top. These were the secret of the table's remarkable movements. The ring was really brass or some cheap metal and had a slit large enough to slip the nail into. Here's a picture of it.

There is no reason why you couldn't "hypnotize" a table in the same way—any little light table such as you find in any home. Only, of course, you do not want to drive a nail into good furniture. Why not make a table for this very purpose? Our department on things for boys to

make, tells you how to make such things. Any locksmith can fashion the right sort of ring for you or you can do it yourself.

Magnetizing a Cane

Here is how to "hypnotize a cane," without any apparatus at all. No preparation is necessary. The cane used is first stroked lengthwise by the performer's hand on the pretense of "magnetizing" it. It is then taken in his left hand while he stands with his left side to the audience, and while held at the center parallel to and against the extended palm, as shown, is pushed down toward the fingers by the pres-

The Trick Ring



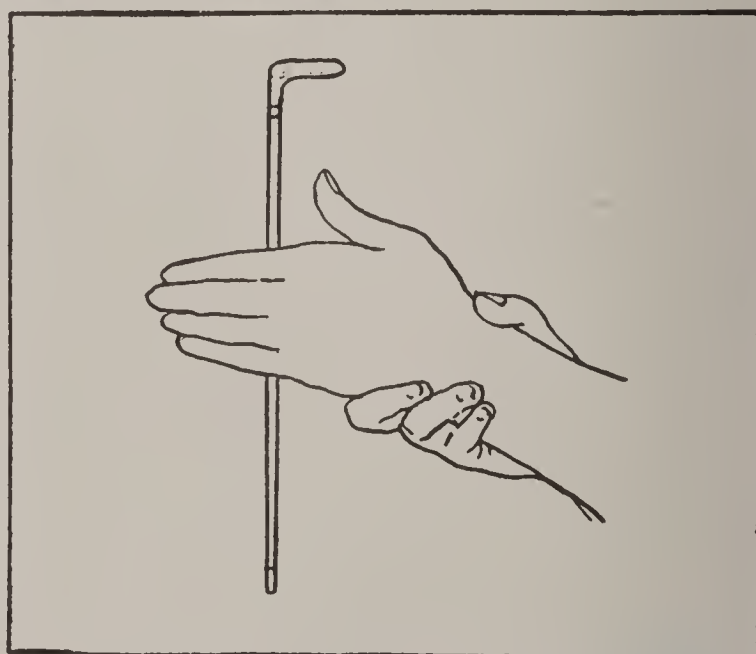
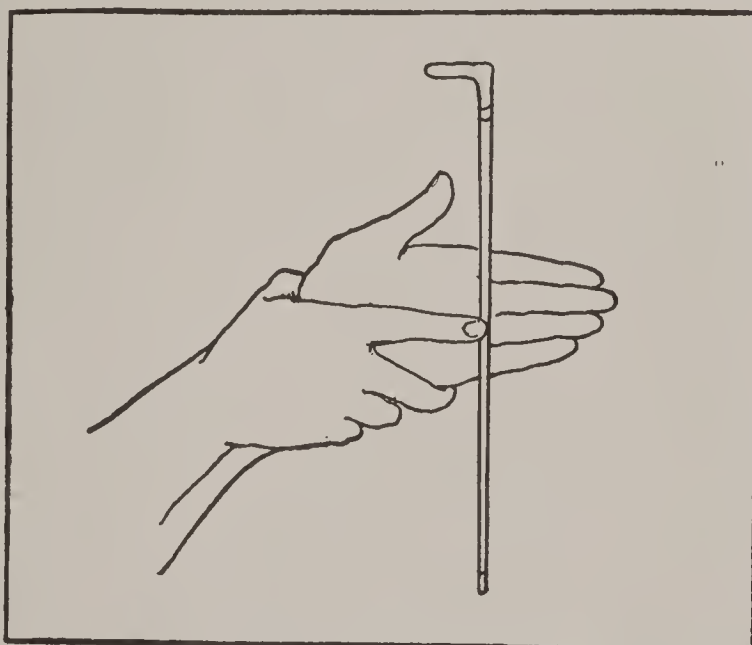
the left wrist, accounts for the effectiveness of the illusion.

This, like other tricks described, will be best understood when you try it.

The Spinning Handkerchief

In the intervals of the performance of more startling tricks, it is a favorite practice for the magician to step to the front of the stage and ask some one in the audience for the loan of a handkerchief. He says, "just toss it up to me." He catches it on the end of a stick and the handkerchief spreads out full size and spins rapidly. He does this in such a casual way that it strongly

This Is How You Magnetize the Cane



The magnetizing of a cane is just as easy as it looks in the picture on the left. You slowly move your hand back until just the tip of your finger holds the cane in place, but, as you see, it looks as if the cane were held simply by sticking to your hand.

sure of the right hand fore-finger upon it from the rear. To the spectators it looks as if the cane were hanging unsupported by the left hand. Spreading the left hand fingers and shaking the left hand up and down strengthens the illusion. A considerably greater distance can be covered by the extended forefinger than is generally supposed. And this, together with the fact that the right hand appears as a whole to be circling

emphasizes the impression of his limitless power over things. The secret is that in the end of the stick a needle is inserted. When the handkerchief is caught on the end of the whirling stick, the needle point passes through it.

Houdin's Magic Ball

Things can also be "hypnotized" so that they will obey you without your touching them at all. The famous

This Table is Hypnotized!

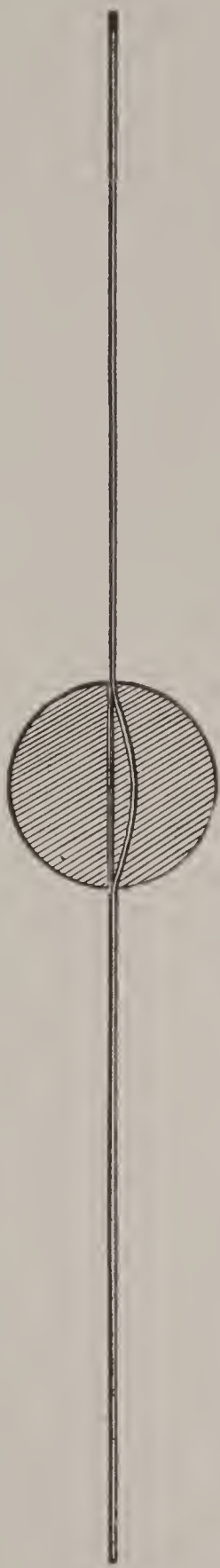


Tables act exactly like this when they have been hypnotized by a competent master of the "black art" like the handsome gentleman we see before us. A wave of the hand and the table gets up and follows him!

magician, Houdin, used to hypnotize a ball in this way so that it would move when he told it to and stop when he told it to. The illustration

shows how he did it. Just by tightening the string a little—a thing which is not noticed—the ball stops. Then by slackening the string just a

The Magic Ball and How it Works



Just by tightening the string a little, as you see the magician doing here, the ball stops. Then by slackening the string just a little—and nobody notices the difference—it starts again. The picture on the left shows how the ball is made to obey.

little it starts again. First of all you pass the string through the straight opening and hand it round through the audience. The ball easily slips up and down the string and will not stop when anybody tells it to. When it is handed back to you, “accidentally”

*All In
How You
Thread It*

let it drop from the string and then, in rethreading it, pass the string through the crooked opening.

How to Force a Coin Through Your Body

But after all it is more interesting than seeing such magic things done to be able to do them yourself. You could not make a lady float in space

because you haven't the apparatus. But here is something quite as extraordinary that you can do—you can force a coin through your body, making it come out, say, at your left ear.

Begin by passing a dime to your audience. Tell them to notice the date or mark it in some way so that they will be sure to recognize it when they see it again. When it has been handed back to you take it between the finger tips of your left hand and rub it on your coat sleeve near your right elbow. Raise your right arm toward your head in doing this. Explain to your audience that the atoms of metal in the dime are being separated and are made to enter your blood by the rubbing. While you are still talking, drop the coin, apparently by accident, and apologize for your awkwardness. Pick it up with your left hand and make a movement as though transferring it to your right hand.

The instant the two hands come together, the fingers of the right hand should be moved so that they appear to grasp the coin, while the left hand thumb quickly presses it in between the first and second fingers of the left hand. Hold it hidden there. If you turn your head and eyes to

follow the supposed movement of the coin from the left hand to the right, no one will doubt but that the dime is in your right hand. The minds as well as the eyes of the audience will

follow your suggestion.

Now stand with your right side toward your audience and raise your left hand again to your head near the left ear while you again seem to be rubbing the dime upon your left elbow. Your left hand is hidden from the audience and holds the coin. Put the dime in the cavity of your left ear while you rub your elbow industriously with the right hand. When the dime is firmly fixed in your ear tell the people that it is growing smaller as more and more of the particles enter your blood. Lift one finger at a time from your coat sleeve, finally

taking away all of your fingers to show that the dime has completely disappeared. You can say now that it has passed into your blood and that all you have to do to make it appear at a certain point is to force the blood to that place. Stroke your head near your left ear to "draw the blood to it," show them that your left hand is empty, and finally take the coin from your ear.

The Coin Starts on Its Journey



Here the magician is just beginning to rub the atoms of the coin into his body. Later on they will come out at his ear!

Simple, Isn't It, When You Know How?



Like most of the very astounding things in the "black art," the secret of passing a coin through the body is very simple when you know how to do it. Here you see is where the coin was all the time—right in the magician's left ear! But you were so busy watching his right hand that you didn't see what he was doing with his left.

Of course you mustn't forget to pass it around for the people to examine to make sure that it is the very same they saw in the first place.

Three Disappearing Coin Tricks

It would seem that no boy need to be told how coins disappear, for what boy doesn't know—to his sorrow—that they disappear all too fast; so fast in fact that they are said to "burn holes" in his pocket. This means, of course, that the average boy spends his money as fast as he gets it. There is, however, a real disappearing coin

trick that is not only amusing, but very instructive, since it illustrates an interesting principle of optics—the refraction of light rays.

Place a coin—say a silver dollar—in each of two glass bowls. By standing a certain distance away from the bowls—the distance to be determined by experiment—the coins become invisible. Then fill one of these bowls with water and the coin immediately comes into view although it remains in exactly the same position it did before, as shown in the second of the

two pictures. The apparent change in the position is due to the refraction, or breaking of the light rays as they pass through the water.

The Foolscap Trick

Another way of making a coin disappear is shown in the next picture. A small drinking glass (e), having pasted across its open end a piece of white writing paper of the same shade and texture as that upon which the trick is to be performed, constitutes one of the essential parts of the apparatus. The pasting is best done by applying mucilage lightly to the edge of the glass and then resting the glass upside down upon the paper which should be laid upon a smooth

How Coins Act in Water

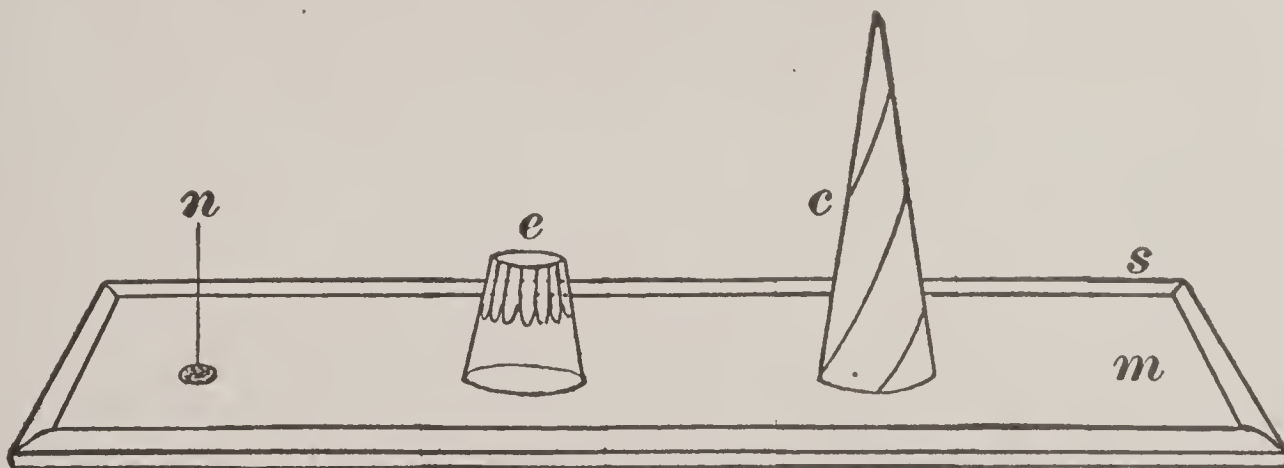


This picture shows the two bowls. The apparent change in position after the water is poured in is due to the breaking of the light rays as they pass through the water.

performed, should be stretched tightly in front of the backboard of the frame, and the backboard fastened in place. A flat coin (n), such as a dime, or a small un-

mounted picture, is now laid upon the writing paper. The paper cone is then slipped over the glass, and the two are lifted together by pressing the fingers tightly about them near the table, and placed upon the coin or picture. After a few mysterious passes of the hands or wand over the cone, the latter is raised off the glass, and the coin or picture is

The Foolscap Trick



This illustration shows you all the things it is necessary to know and do to properly perform the fool's cap trick—how to fold the fool's cap so that it will fit around the glass—and everything!

flat surface. When perfectly dry, the surplus paper should be trimmed closely to the edge of the glass. The paper cone or foolscap (c), which should fit closely at its lower part around the glass (e), is easily made with paper and mucilage. Although not absolutely necessary, it is well to

found to have vanished. The paper covering of the glass, being indistinguishable from the paper surface beneath it, effectually hides the object from view. To bring back the coin or picture (n), place the cone over the glass, repeat the passes and

*How the
Paper Does
the Trick*

remove both glass and cone together, whereupon the object is again brought in sight. It is advisable before taking away the apparatus, to remove the cone from the glass and pass the cone around for examination. The prepared glass, however, should not be removed from its white resting place while in view of the audience.

Best Trick of the Three

A third disappearing coin trick—perhaps the most interesting of all—is done with nothing but a little pill box properly “instructed” in its part. The pill box should be one-half or three-quarters of an inch deep and seven-eighths of an inch inside diameter. Three five-cent coins of the same date are also needed. One of the coins is hidden in a certain part of the audience room, another is used in connection with the box, and the other is kept in the handkerchief pocket to be substituted for the coin received from one of the audience.

The entire interior of the box, including the cover (a), is painted or inked black, and the nickel or coin (c), used with the box is covered on the side where there is no date with paper, also painted or inked black. The paper should be pasted smoothly on the coin and trimmed closely about its edge. In beginning the trick the performer asks the audience for a five-cent coin. While the coin is being passed up he shows the box and asks that it be carefully examined. The box and cover are now passed around for examination, but the prepared coin is held concealed in the performer’s left hand. The coin from the audience which he has taken in his right hand he now apparently transfers to his left hand, but in

reality retains it in his right, and under cover of reaching for a handkerchief in his pocket drops it therein, and taking out the coin he has previously placed there. When the

box is returned the performer happens to think that perhaps the audience would like to see the date on the coin so it can be identified later, so he passes the one out which he has just taken out of his pocket. When it is returned to him again he pretends to place it in his left hand but really

holds it concealed between the fingers of his right hand while the coin in his left hand is now shown to the spectators with its uncovered side to the front so they can see the date, and is dropped into the box in full view of the audience. As it is lowered into the box, however, it is turned with its paper side up. The box is then closed and shaken up and down to prove by the noise made that the coin is still inside.

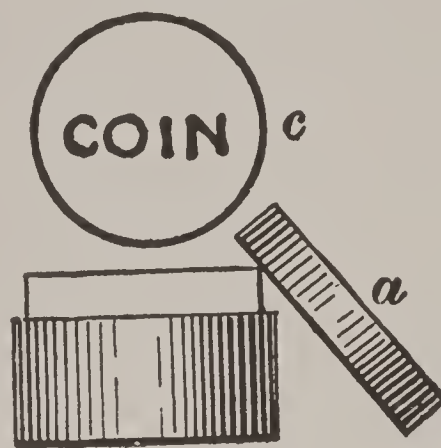
The performer now fans the box for a few seconds and repeats the following incantation: “Hanky-panky, hocus-pocus, hunky-bunky my, one I say, two I say, three I say, fly!”

The box is then shaken crosswise. No noise is heard because there is no space inside for the coin to move sideways. As the indications are that the coin has vanished, the cover is taken off and the box is shown to be empty.

The reason the box appears empty is that the black side of the coin being uppermost the audience can’t tell it from the black interior of the box, and being of nearly the same diameter as the box, appears like the bottom.

Having satisfied the spectators that the coin has vanished, direct the one

The Mystic Box and the Coin

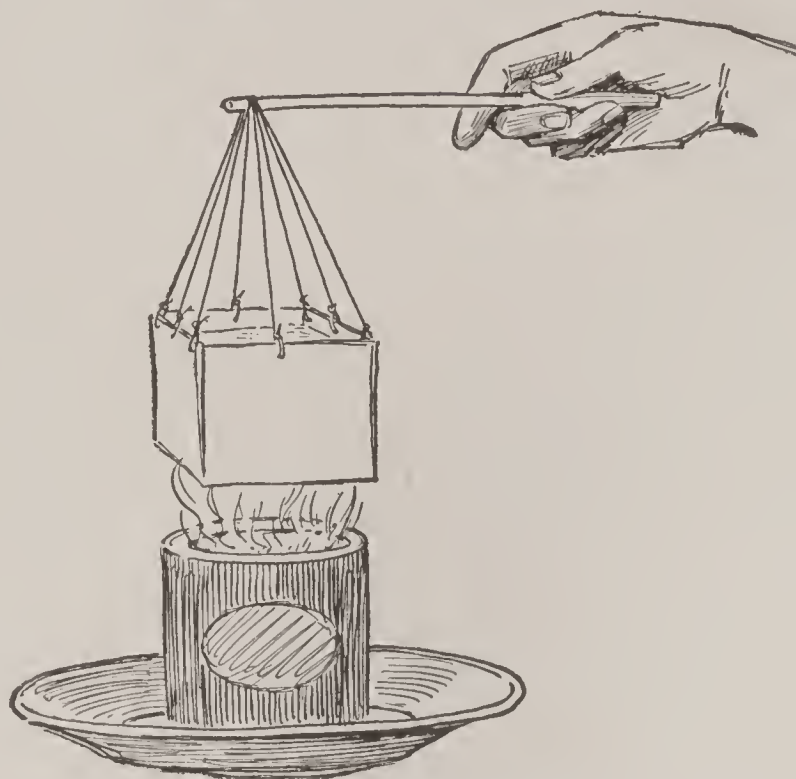


Why
the Box
Seems Empty

from whom the nickel was borrowed to search for it in a certain part of the room, that part of course being designated in which the nickel was previously [placed]. When he has found it, ask to have it recognized by the date on it as the one previously obtained, thank him for the use of the coin and wish him always his present luck in recovering the money he lends. It helps on with the entertainment for the performer to get started in the next trick and then to suddenly remark, as if it has just occurred to him, "Oh, by the way, perhaps the owner of that nickel would like to have it back." Then tell him where to find it.

Make a small paper box by folding some ordinary, heavy writing paper. Suspend it by four threads to a board or stick, as shown in the picture.

Boiling Water in the Paper Case



Anybody would suppose that a paper case like that—it is a paper case—would take fire from a flame, wouldn't they? That's just what your audience will wonder about if you perform this clever trick as explained.

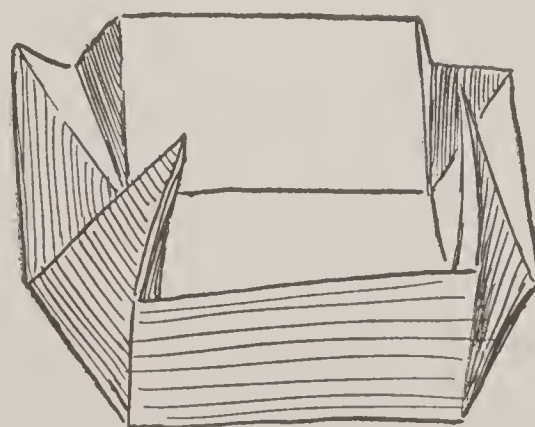
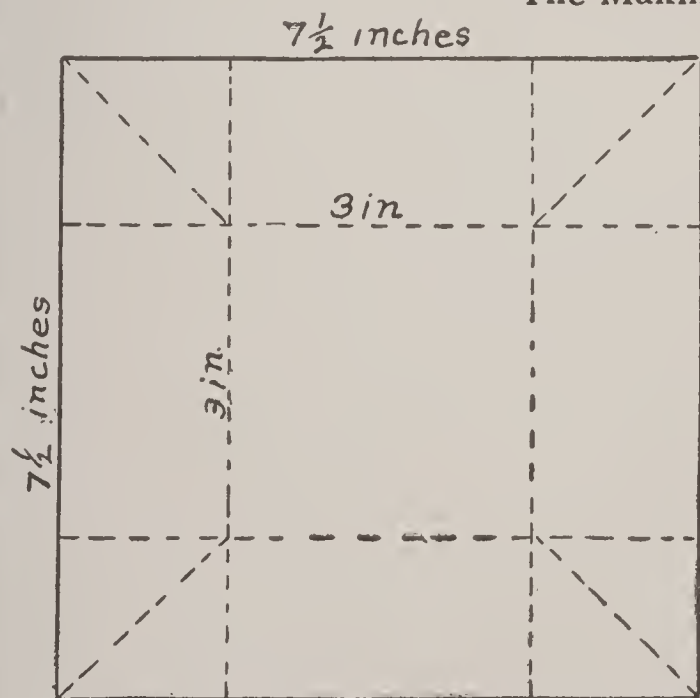
Next fill it with water and put an alcohol lamp in a plate, as the threads holding up the paper of water may break. The paper does not burn because the water absorbs the heat.

How to Read People's Minds

Here is a domino trick that is a puzzler to those who are not in the secret. Even if you are blindfolded and guarded in another

room, you can tell the end numbers of a matched row of dominoes as many times as they can be shuffled and matched, if you will

The Making of the Paper Box



HOW TO FOLD THE BOX

These two illustrations, the diagram and the picture of the box as it begins to be folded, will show you just how to get ready for the paper box trick.

Boiling Water in Paper Case

Boiling water in a paper case sounds like magic, but it can easily be done.

always do the shuffling yourself. Tell your audience that you can find out those end numbers by reading

their minds. Since a full set of matched dominoes forms an endless chain, if you take one domino away,

*Secret of
the Domino
Trick*

the numbers on it will be the same as those on the ends of the matched row.

When you shuffle the dominoes, slip one in your pocket and look at it on your way to be blindfolded. Then you will know what the end numbers on the dominoes that are left will be, when the whole set is matched. (Have anyone in the audience do the matching while you are out of the room.) Suppose the domino you took was 2-5, then 5 will be one end number and 2 the other. If it was 4-4 there will be four dots on the dominoes at each end of the row.

Another "mind reading" trick makes use of the numbers on the dial of a watch. Tell someone to think of one of the numbers on the dial and ask him to add one to it every time you tap the face of the watch until he reaches twenty, then to

*Reading
Minds by Use
of a Watch*

notify you. Tell him that by the time twenty is reached you will have read his mind and can tell him the number he is thinking of. For the first seven taps you may strike at random any of the numbers on the watch face, but at the eighth tap strike twelve, next eleven, then ten and so on backward until you are told to stop because twenty has been reached. Your pencil will then rest on the number the other person had in mind.

The reason for this is simple. If twelve was chosen (the highest number on the watch dial), eight taps will bring it to twenty and the eighth tap should always be on twelve. If eleven was thought of, you will make nine taps before being told to stop, and, following directions, your ninth tap should be on eleven. If six was the chosen num-

ber, fourteen taps will raise it to twenty and if your eighth tap was twelve, your ninth tap eleven, and so on, your pencil will rest on six at the fourteenth tap. The trick can be done with several people at once, each choosing a number. You can also use any number beyond twenty, also the number eighteen. If using twenty-five as the number at which your tapping is to cease, add five more random taps—that is, strike twelve at the thirteenth instead of at the eighth tap. If thirty-one is the limit, add eleven more random taps because thirty-one is eleven more than twenty; strike twelve the nineteenth time. If eighteen is to be the limit, use two less than seven random taps. But remember that only the numbers on the watch face—from one to twelve—can be chosen.

The Hat and Die Trick

You know a magician is always asking people in his audience for hats and then apparently doing all sorts of things to them. Here is a trick with a hat and a die that always makes no end of fun.

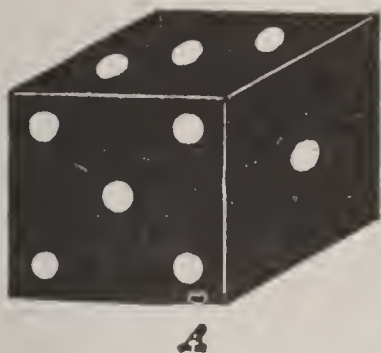
Procure a playing block or other square block of wood measuring about three inches on a side, and paint it to represent a die by first giving it a coat of black paint and then with white paint marking the spots on it—one and six on opposite sides, two and five on opposite sides, and three and four on opposite sides.

Around this die (A), build up with stiff cardboard and mucilage or with tin and solder, a hollow die (B), one side open, making it just large enough to slip easily over the wooden block. Paint the sides of the box thus formed so that they correspond with the block, making the white spots about the same size. A cardboard cover (C) for the hollow die

completes the outfit. This cover should be made the same as the hollow die except that it should be about one-eighth inch larger and more ornamental. Colored paper or cloth

was originally placed, it will now be in the proper position for exhibition. Those in the audience too dull to see through the trick will marvel at it; the others will appreciate it as a good

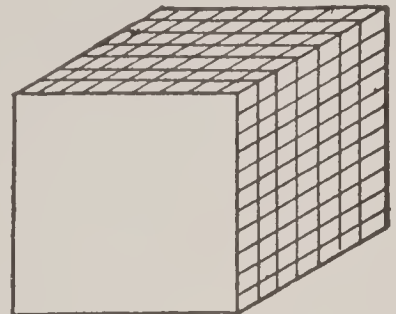
These are the Dice



A



B



C

These illustrations show you how to paint your blocks so as to make dice of them. It also shows the cardboard cover.

of oriental design pasted over the cardboard gives the desired ornamental effect.

As an introduction to the trick, the following piece of nonsense is appropriate: Obtain from the audience two stiff hats and place them brim downward, several feet apart upon a table. Let the spectators examine the solid wooden die and

then place it under one of the hats. Command the die to pass from the one hat to the other. Without raising the hats, to illustrate your point, assure the spectators that the die has obeyed you.

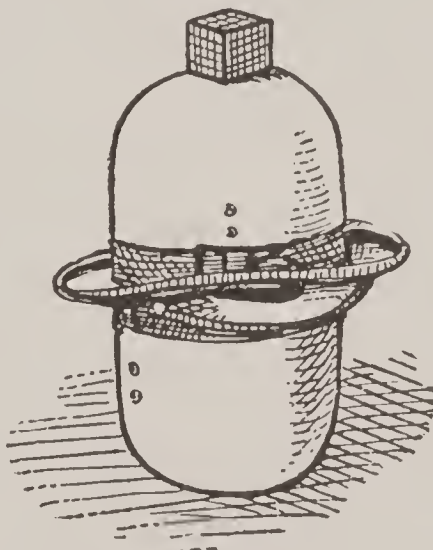
Then tell them that what has just taken place, although wonderful in itself, is tame in comparison with what you will now force the die to do. Advise them to watch closely, and that if their eyesight is sufficiently strong they will see the wooden block travel backward, because you will make it go slower this time. Then raise the hats. As the die will, of course, remain where it

joke and laugh themselves in condition to enjoy the real mysteries of "The Traveling Die," which should be presented as follows:

The performer takes the solid die in one hand and the cover with the hollow die within it in the other hand. He lays these upon the table, placing the cover so that the spectators do not see the hollow die. He then arranges the two hats brim upward and calls

attention to the solid die being simply a block of wood, letting it fall upon the table to prove it. Picking up the cover and explaining that it is an ordinary one, he drops the solid die within it, turning it so that the corresponding sides of both solid and hollow die have the same number of spots; then tipping over the cover, he allows the solid die with the hollow

The Hats



Here are the hats just before the die goes through them.

one over it to drop into his hand, and carelessly tosses the two together into one of the hats.

After holding up the cover so that the spectators can see there is nothing in it, the performer apparently takes

out of the hat the solid die, but in reality the hollow one, and places it open side downward upon the crown of one of the hats, which is then placed upon the other hat. Placing the cover over the hollow die, the performer waves his wand, and commands the die to pass through the hat. A slight pressure upon the sides of the cover in raising it will hold the hollow die within, and if the performer immediately places both upon the end of his wand the cover will appear empty. The solid die will, of course, be found and shown in the lower hat.

By doing the thing backward, the die can apparently be made to pass from the lower hat to the crown of the upper one, and then back again as before.

Watching the Bird Go into the Cage

Draw on a sheet of paper a bird cage and a bird, with a dotted line between them, as shown. Show the sketch to the spectators, then take an ordinary visiting card and, touching it with your wand, as if to give it the necessary "magical influence," say that the card now has the power of enabling anyone who looks at the sketch to see the bird enter the cage.

Why the Bird Goes into His Cage Have the person trying this experiment hold the card perpendicular to the paper along the dotted line, as shown in the picture, so that the light does not cause the card to cast a shadow

on the paper. With the end of his nose against the edge of the card have him look with both eyes at the cage and the bird. At first he will see the bird and cage separately, but soon the bird will move and enter the cage and

stay there! The illusion is due to the impressions of the two objects being sent to the brain separately and then one imposed upon the other, as in looking through a stereoscope.

How Bodiless Heads Talk

In the sideshow at the circus you can sometimes see a seemingly bodiless head resting on a table. It will answer questions, smile and bow to the audience with all the appearance

of being alive. This looks strange but the explanation is simple. Slanting mirrors reflect the front table legs and side curtains of partitions of the booth so that you seem to be looking under the table, seeing all four of its legs and the rear partition behind them. In reality the mirrors are a screen for the body of the woman whose head seems to you to be resting on the table top with no body to support it.

Making Fresh Eggs to Order

For this trick you must have a flat flannel or alpaca bag, about eight inches long and six inches wide. Mother or sister will no doubt be glad to do this part of the trick for you. Hem it around the top but

The Bird About to Go Into the Cage



Hold the card as here shown and you will see the bird enter the cage. (The same thing will take place, of course, when any member of the audience tries it.)

Getting Ready for the Egg and Bag Trick



Here the magician is holding the bag for the egg and bag trick in his teeth, while fastening his cuffs preparatory to rolling up his sleeves, as all well-regulated magicians do to show that they have nothing concealed in the sleeves.

make one side six inches longer than the other and fold the extra material inside, sewing its sides to the side of the bag, thus making a pocket on the inside, open toward the bottom.

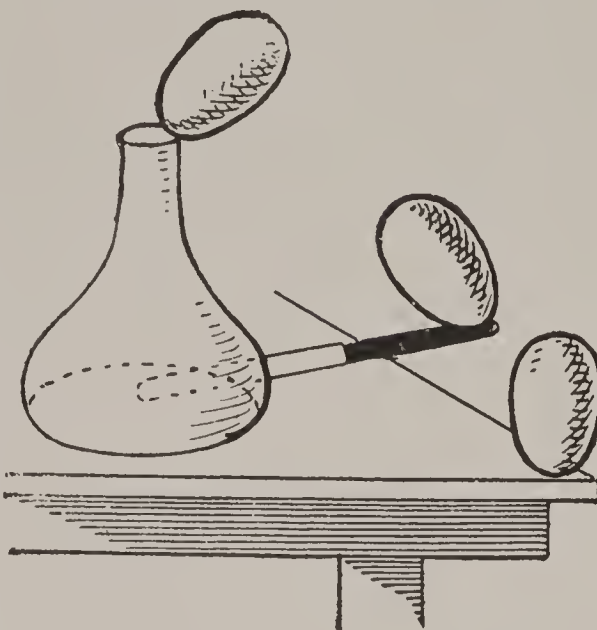
Pierce holes in the ends of a fresh egg with a needle. By blowing hard into the hole at the larger end the contents of the shell can be emptied through the opposite hole. When the shell is thoroughly dry partly fill it with fine sand. Flesh-colored court plaster or small pieces of paper the color of the shell pasted over the holes will keep the sand from running out and will not be noticed by the audience.

Put this egg in a corner of the inner pocket which, of course, is at the upper edge of the bag. Now you are ready for the trick. Pick up the bag by both upper corners, pocket side toward you, grasping the egg with one hand, and shake it out to show that there is nothing in it. Then, still holding the egg, turn the bag upside down, releasing the egg, which will remain in the pocket of its own accord when the bag is in this position. If there still remains a doubting Thomas in the audience, he will be convinced when you turn the bag inside out. After you have

done this you might hold the bag in your teeth and roll up your sleeves to show the audience you have nothing hidden in them. Then, turn it back to its normal position, right side up, with the pocket side always toward you. Let the egg drop into the bottom of the bag and hold it so that the right corner is lower than the other; the egg will roll into it. This handling of the bag with the egg in it takes much practice, otherwise you will bungle and spoil the trick. As conclusive proof that the bag is empty, hold it in the right hand by the corner containing the egg, then twist it as if you were wringing water out of it. Then, still holding it in your right hand, you might knock the bag against a chair or table as if you were beating dust out of it. As you pull the egg from the bag and show it to the audience, make a "clucking" noise like a hen, or some other nonsense that will amuse them.

Then tell them that this isn't an ordinary egg at all, but a magic egg which shows such respect for its creator that it remains in any position in which he places it. By tapping the egg when you set it down, the sand is jarred to the bottom of the egg as it stands and will hold it in that position. In this way you can set the egg down at any angle and it will stay there. With a little practice you can apparently balance the egg in all sorts of positions contrary to the laws of gravity—on a knife blade or the edge of a dish.

The Egg and Gravity Trick



The Magician's Omelet

While we are still in the "egg business," let us notice how the magician makes an omelet on the stage. He shows the empty omelet pan which is heated over a lamp. His wand is hollow and has a cork at the end, but the spectators do not notice this because it is painted to correspond with the rest of the wand. As soon as the pan is placed over the fire, he slips the cork out without any one noticing it, the egg already beaten up flows from the wand and is cooked in the usual way and shown to the audience.

How to Spin an Egg

A raw egg cannot be spun, so a hard-boiled egg should be used. It can be spun in a small shallow Japan tray which is kept moving gently in a small circle in an opposite direction to that in which the egg is spinning. The latter will continue to spin.

How Bogus Ghosts Are Made

The illustration of the ghost of the candle shows how bogus ghosts are made by conjurers. Set the water bottle on a book and place the lighted candle near it on a table. Put a sheet of plate-glass exactly half the distance between them, perpendicular to the table top. The glass will reflect the lighted candle and it will seem to be burning in the midst of the water. This happens because mirrors and plain glass reflect objects as though they were at the same distance behind the glass as they really are in front of

*The Ghost
of the
Candle*

it, just as Alice's Looking-Glass House seemed to be *behind* the mirror.

This kind of a "ghost" is sometimes used by draughtsmen in getting exact copies of pictures. The picture to be copied is on one side of a sheet of glass, and a piece of blank paper on the other. A ghostly image or outline of the picture appears on the blank paper, reflected there by the glass.

The Candle and Its Ghost



Here you see the real candle, and the ghost of the candle in the decanter of water. By carrying out this same idea on a larger scale, ghosts can be produced on the stage.

match to anyone who may be looking on and ask him to raise the three together by means of the match in his hand. The right hand picture shows you how to do it.

Advice to Young Magicians

There are some things which you must remember in order to become a good performer of magic.

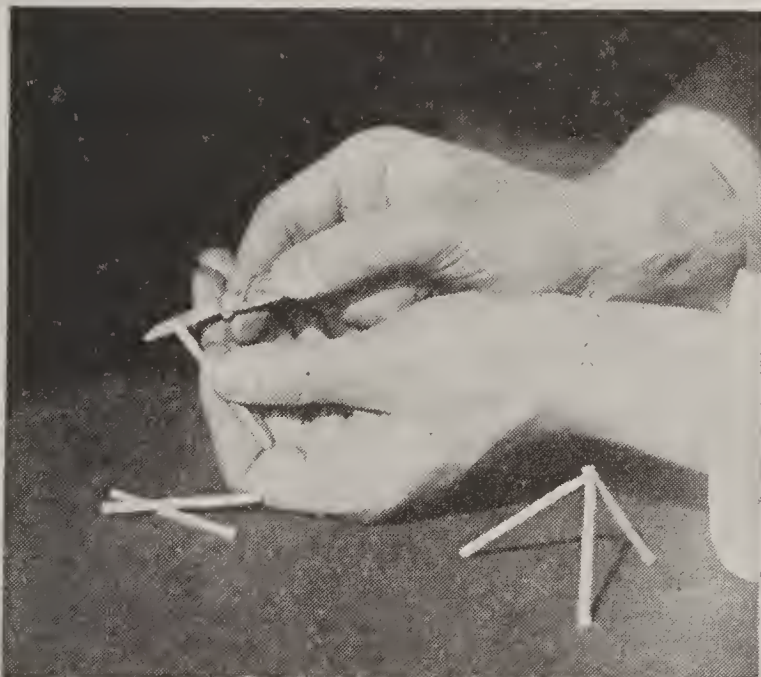
1. Don't try to do a trick until you have practiced it often enough to be sure you are letter perfect in it.

2. Never tell your audience in advance what you are going to do. Keep them guessing what your next move will be. Then, if you have a failure, you can turn it off more easily and without embarrassment.

A Simple Match Trick

To lift three matches by means of one, make a cut in the end of a match, as shown in the illustration, and insert the pointed end of the

A Clever Match Trick



If you ask somebody to lift three matches with one, it will look hard to him, but you can show him that it is one of the numerous things that are easy if you only know how.

second match into this incision. Place them on a table with the third match resting against them for a support, as shown. Then, present a

3. Don't hurry. Professional magicians are always deliberate. Know just what trick you are going to do next and how long it will take

you, but give your audience a breathing spell between tricks.

4. Never repeat a trick before the same audience, even if asked to do so, unless you want to show them how it is done. It is often nice in social entertainments and increases the interest and pleasure of an audience to

explain, say, one trick; but let it always be the same trick, otherwise everybody will soon know all your tricks and your occupation as a magician will be gone.

5. Don't bore your audience by too long a performance. Stop before your store of tricks is exhausted.

Delightful Games To Play Indoors



LONG after you have forgotten the ice cream and cake eaten at a party, you remember the fun you had playing games. A good host or hostess will be prepared to suggest and start interesting games; or when a rainy day keeps you indoors, with such resources you may have as happy a time as out of doors.

There are many active games that can be played without injury to the furniture or *bric a brac*, that are far more fun and more exciting than a mere "rough house" play. Some old favorites that are not described in this

*See "Games for the Playground, Home, School and Gymnasium," by Jessie H. Bancroft; The Macmillan Company.

book*, every child should know and play at some time in his life—such games as "Going to Jerusalem," "Hide the Thimble," "Spin the Platter," "Stage Coach," "Dumb Crambo" and a dozen others. Assuming that these are already known, some more novel games are given here.

In all blindfold games a fresh, clean handkerchief should be used, and if any player has sore eyes or skin he should have a handkerchief of his own that no one else will use. Indeed, it is better for each player to have a little strip of old muslin or fresh cheese cloth to use only for

*Caution about
Blindfold
Games*

himself, instead of one blinder to be used for all. It is safer.

Game of the Tethered Bear

A round table is placed in the center of the room, a large dining table being best. Two blindfolded players, one representing a bear, the other a hunter, take places on opposite sides of the table, with the left hand on the edge of the table so that only the finger tips touch.

The player who represents the hunter calls out, "Bear, where are you?" Then the bear growls. The hunter then tries to catch him by circling around the table. The bear

You Just will of course, try to get
Growl, away from the hunter.
Then—! He may do this by step-

ping in either direction, or, if nearly caught, by dodging under the table, *but neither hunter nor bear may remove the finger tips from the table edge.* When the hunter succeeds in tagging the bear, they exchange places. Or should there be more than two players, the bear then becomes hunter and the hunter retires from the game, while another player becomes bear.

This is one of the few active games for two players indoors. It makes a fine evening or rainy day game.

Game of Shepherd and Sheep

This game combines the features of the various forms of "Blind Man's Buff" with an imaginative atmosphere that is especially amusing for younger players.

One player takes the part of the shepherd; the rest are sheep. The shepherd is blindfolded and led to the stable, which may be a corner of the room or a piece of furniture. One of the sheep taps him on the

shoulder and says, "Shepherd, shepherd, how many steps may I take?"

A Little Shep-herd Who Can't See The shepherd mentions the number and the sheep then takes that number of steps in any direction he chooses, or he may take part of the number in one direction and the rest in other directions. At the end of the designated number of steps, he must stand still.

One sheep after another repeats this play until all of the sheep have been disposed of. The shepherd then calls "Where is my flock?" Whereupon all of the sheep must bleat. The shepherd then moves around, trying to catch a sheep by the direction indicated by the voices, though the players bleat but once, and are thereafter silent. When the shepherd catches a sheep, he asks "Who are you?" The one caught bleats again once, from which sound the shepherd must guess the name. If the guess be correct, the one caught becomes shepherd for the next round. Should the guess be incorrect, the shepherd is chased back to the stable by all of the sheep and the game begins anew.

Game of Two Seat Tag

All of the players except two are seated. It adds to the sport if some of the chairs are placed side by side, and others irregularly, facing in various directions, there being a few more chairs than players.

The two extra players, one runner and one chaser, stand a little distance from each other, and at a signal start a game of tag. *You're It,* The runner may save
So himself at any moment
Run! by sitting in the seat with one of the seated players, who then becomes

"it" and must run from the chaser. When the runner is near a seated player, so that the latter is in danger of being chosen as a seat partner, the seated player may slip into the next chair, or run for a distant one.

Whenever the chaser tags a player, they exchange parts, the chaser becoming runner, and the runner chaser.

This Is How to Play "Keeper's Ring"

A large circle is drawn on the floor, or it may be outlined with a piece of cord, or the space of a rug may answer the purpose. Within it stands one player, called the keeper. Within the ring are scattered a number

Watch Your Sticks, Mr. Keeper! of sticks (clothespins will do), about half as many as they are players.

The remainder of the players take their places anywhere outside of the circle. The object of the game is to steal the sticks from the keeper by venturing into his ring or reaching into it. Any player tagged by the keeper while any part of the player's person is within the ring becomes a prisoner, and is out of the game until all are caught. The last one caught becomes keeper for the next round of the game.

A player may be tagged who is not standing in the ring, but merely reaches into it with his arm, and the keeper may at any time reach beyond the ring, but he may not step beyond it.

The Serpentine Relay Race

The players are divided into equal groups, and stand in two or more single files. The first player in each file stands toeing a starting mark and all of the other players in the file must be a full arm's distance

apart. At a signal the first player in each line runs forward to a goal some distance in front of the starting mark, and, returning to his line, touches No. 2 on the shoulder and immediately proceeds in a zigzag or serpentine run from side to side down through his file of players to the end of the line, where he stands back of the last player.

As soon as No. 2 has been tagged by the returning player, he runs forward to the goal and, returning, tags No. 3 and then runs in a zigzag down the line. The line whose last player is first to get to the rear of his line after his serpentine run wins the game.

This Is the "Mouse Chase"

Two cats are chosen and stand at one end of the room. All of the other players are seated except the mice, of which any number may be chosen. These take their places, standing at the opposite end of the room. The leader says, "Scat!" whereupon the mice try to reach a safety goal in one front corner of the room while pursued by the cats. The first two mice caught become cats for the next game.

If the center of the room is filled with scattered chairs and tables, it will aid the mice, as they can dodge around them in trying to get away from the cats.

The Good Little Man

One player says, "I'll sell you the house of my good little man." The next, "I'll sell you the door of the house of my good little man." The next, "I'll sell you the lock of the door of the house of my good little

man." The next, "I'll sell you the window of the house of my good little man," etc. Each player adds some article suitable for a house, and in so far as practicable should include in his statement some part of the house that has been named by a previous player, such as the door, by mentioning "the lock of the door."

The game may be applied to many things, such as parts of an engine or boat.

Any player failing to respond promptly may be asked to pay a forfeit as in other forfeit games.

The "Traveler" Game

The players are seated in a circle with an odd one in the center who holds a small soft ball. This may be made by crumpling up a piece of paper or knotting a handkerchief. The game is played like "Beast, Bird, or Fish," but as here used, is applicable to a wide range of subjects.

The player in the center throws the ball at any other player in the circle just when he isn't looking and calls out the name of some country.

Use Your Geography and History The player hit by the ball must immediately answer by naming some person or object associated with the country. For instance, if the center player in throwing the ball should cry "Africa," the player hit might reply, "Jungle," or "Cecil Rhodes," or "Boers." If England, the reply might be "Shakespeare," or "Wool," or "St. Paul's Cathedral." Any player failing to answer changes places with the center player.

Game of the "Fish Pond"

This game is something like the popular game known as "Catch of

Fish," the modifications adapting it better to large numbers, especially for little children, as it is less rough, and requires greater activity for each player.

The players stand in two concentric circles, one large outer circle representing a pond, and within it a small inner circle composed of players representing a fish-net; the smaller circle contains four players. The players of both circles join hands.

Two players, chosen by the leader, stand between the large outer and small inner circles and represent fish. The players representing the net try to catch these fish by placing the clasped hands over their heads, thus gathering them in the net. The fish dodge between the two circles, but may not go outside of the pond. When a fish is caught he returns to the outer circle and chooses from it another fish to go into the pond in his place. The leader may, if he wishes, have the players who form the fish-net return to the circle and name others to take their places, so that every one of the little fish may have an equal share of running about.

A Game Where Everybody Keeps Still

This game is played in two forms, for younger and older children.

All of the players but one are seated. The odd player stands in front of the others and nods to any other player whom he chooses. The player thus indicated must at once run forward and shake hands with him. The first player then takes his seat and the one to whom he nodded faces the other players and in his turn nods to some one. The

How These Little Fish Dodge!

A Little Land of Nod

entire game for little children thus consists in nodding, running forward and shaking hands and an exchange of places.

Any player not quick to recognize a bow made to him is not waited for; the leader at once bows to another.

This is one of the few very quiet games and is very interesting to little children.

For older children the player who comes to the front may be required to stand in any pose suggested by the player who nodded to him, and in that pose must nod to his successor and wait until he comes forward.

In this form of the game, any player in the group who laughs, or who fails to recognize when he is nodded to, or who fails to hold his pose, is required to pay a forfeit.

"Indoor Ball" for Little Folks

All but two of the players stand in a line (or semi-circle) facing one of their number who is to toss a ball to different members of the row facing him. The odd player who tosses the ball should stand at as great a distance from the others as the space will admit.

Running at large between the ball tosser and the line of players is a second odd player who tries to tag any player while the ball is in his hand. This may be one of the players in the line or the ball thrower. Any player so tagged changes places with the tagger.

To make the game interesting, the tossing of the ball should be very rapid and the ball thrower should send it in unexpected directions to the various players. It should not go in consecutive order, the object being to make the work of the tag-

ger as difficult as possible, you see. This game is called "Catch Ball."

This Makes Geography Interesting

The players are divided into two groups, each with a leader. The leader of one side calls out the name of a city which begins with the letter A, and immediately counts ten. Before he has finished counting ten, the leader of the opposite side must name another city beginning with A. This is continued, the first leader remaining leader until his opponent fails, each successful answer scoring

one point for the side making it. When a failure is made, the opposite group takes its turn at calling and their opponents have a chance to score. Each time a group has a turn for leadership, a new player of their number becomes leader, so that in the course of the game each player may occupy that position. A leader may call a name beginning with any letter of the alphabet; that is, he does not have to use one letter in consecutive names, but whatever letter he uses must be the initial letter of the name with which his opponent replies. For instance, the leader's call and the opponent's response might be as follows: Chicago, Cincinnati; San Francisco, Syracuse.

Other names may be used than those of cities, such as states, rivers, mountains, countries, or provinces, etc.

This same game may be played by the leader calling out some geographical division, when the opponents' leader must reply by naming something that comes within the classification. For example, one leader may say, "Mountain," the other may reply, "Rockies" or "Pike's Peak," or the leader may

say, "Bay," and the opponent answer with "Baffin's Bay," or "Bay of Naples," or some other bay.

And Here's a Railway Ride!

A circle of chairs is formed consisting of any number, but it must be one less than the number of players. All of the players should be seated facing toward the center of the circle. The odd player stands in the center. At a signal from the center player, the train moves, i.e., all of the players change chairs, one seat at a time, all moving in one direction and the center man tries to secure a chair while this is being done. Any player so left without a seat takes his place in the center of the ring.

The distance between the chairs and the variety in their shape will add much to the sport of the game. Arm chairs that are awkward to get in and out of are especially good for the purpose. In case of a dispute about a chair, the player who first touched the seat in any way is the possessor of the chair.

A "Petrifying" Game That's Lively

This is a game of "tag" in which all players touched or tagged have to assume a prescribed position until freed by some other player. As there are several taggers, the game may be very lively.

For twenty-five players there should be about four chasers or taggers. These should be marked in some distinctive way, as with a handkerchief tied over the arm.

They take their places apart from the rest at one side or end of the room. At a signal, the taggers run toward the other players, trying to

petrify (tag) them. Anyone so tagged by one of these four players has to stop immediately and spread the arms sideways, remaining perfectly still as though petrified. Such a player may be freed by being tagged by one of his companions.

The double effort of evading the taggers and freeing one's companions makes this a very lively game for all except those that are petrified. The position of these players, however, being rather fatiguing, the game should not be continued very long, or it may be modified by requiring a less tiresome position of the players who are petrified.

The "Thief and Policeman" Game

The players are evenly divided and stand at opposite ends of the room, each behind a straight goal line marked across the width of the room. One of the groups of players are thieves and the opposite group policemen. Each group lines up in single rank back of its goal line and the players are numbered consecutively from one to the highest number of players. The numbers should be diagonally opposite to each other. For instance, if there are ten players on each side, number one of the policemen would stand diagonally opposite number ten of the thieves, and number ten of the thieves would be diagonally opposite number one of the policemen.

A handkerchief or other object is placed in the center field a little nearer to the thieves than to the policemen.

The leader of the game calls any number, for instance number five, when the thief and policeman bearing that number at once start for the handkerchief. The object of the thief is to get the handkerchief and

run back to the goal before the policeman can touch him. Should he succeed in doing this, the policeman becomes his prisoner. Should the policeman tag him before he can get home, he becomes the policeman's prisoner.

*The Police-
man and the
Prisoner*

A very funny feature of the game, and one that adds much to the playing value, is the rule that a policeman must imitate the thief until the

*Playing Thief
to Catch
the Thief*

latter has touched the handkerchief. For instance, the thief may run

directly for the handkerchief, in which case the policeman would do likewise, or the thief may stop part way and take a step backward, move around the handkerchief, etc., when the policeman must step backward, or imitate any other movements of the thief. The thief may reach his hand out toward the handkerchief, but the instant he has done this, the man must imitate this also. No chase or tagging may take place until the thief has touched the handkerchief, but the instant he has done this, the policeman may chase him.

Prisoners are placed in one corner of the victor's goal. When all players have been caught, the line having the larger number of prisoners is the winner.

Target Ball

A target of wood or cardboard is made, two feet square, or two feet in diameter. It is then painted with a bull's eye in the center and four circles of different colors around this, each about two inches wide. The bull's eye should be four inches in diameter. The target should be hung or fastened on the wall at a height of about four feet.

The players are divided into two

equal teams, each under a leader. The game consists in throwing a hand-ball at the target, the players of the two sides alternating. The ball scores for a team according to the place on which it strikes the target. To hit the bull's eye scores ten points. To hit the circle beyond the bull's eye scores four points, and the circles beyond this score in succession three, two and one points, respectively.

*A Game
for
Good Shots*

The throwing is done from a line drawn fifteen or twenty feet from a wall on which the target is placed. The ball may be a light, hollow rubber ball, or a ping pong ball. Each player has but one throw, and the players of each team alternate until all have thrown. The team wins which has the larger score when each player has had a turn.

One player should be appointed as score-keeper.

Game of Merchants

One player acts the part of merchant. He appears before the others and tells them what country he is from; whereupon the others guess what he has to sell, his wares being the product for which the country is well known.

*Things Mer-
chants Should
Know*

Each player scores one point for a correct guess. When the right article has been named, another player acts the part of merchant, and so on, until all have taken the part. The player having the largest number of correct guesses at the end, wins.

A merchant may, for instance, announce that he is from Persia, and the players may guess that his wares consist of rugs or silks; or he may be from Japan, and his wares may be rice-paper or pottery; or he may

say Brazil, and his wares may be coffee or mahogany.

The Calendar Game

All of the players are named for something found on the calendar, each having the name of a day of the week, a month of the year, or, if there are enough players, any number from one to thirty-one. Thus one player may be Monday, another Friday, another March or August, and yet others the fifth or twenty-first.

All but one of the players are seated, and, as in most sitting games, the fun will be increased by having the chairs placed irregularly through the room, so it will not be easy to get around them.

The odd player stands either at one end of the room or in the center, and bounds a rubber ball, at the same time calling some name from the calendar. *Are You Mr. Friday or Miss March?* The player having that name must run forward and catch the ball before it bounds a third time. If he fails, he pays a forfeit and goes back to his seat. If he succeeds, he changes places with the player who bounded the ball.

The game may end in either of two ways:

(1) It may continue as described until each player has either had a turn or paid a forfeit; or

(2) The players may be in two competing groups or teams, the side winning which has the lesser number of forfeits when all have been called. In this form of the game the player who bounds the ball must call a name held by the opposite team, it being understood how these are divided. For instance, one team may take names of months and weeks; the other dates to an equal number.

You'll Like These "Boston Beans"

In the game called "Boston Beans," the players are divided into two or more groups with equal numbers in each group. For each group a bowl of slippery, white, dried beans is provided. The beans are turned out on a plate at one end of the room and the empty bowl placed at the opposite end.

At a signal the leader of each group tosses a handful of beans with one hand and tries to catch them on the back of the same hand, as in "jackstones." *Not So Easy to Do* Those that are caught he must carry on the back of the hand as they fall, to the opposite end of the room and empty them into the bowl. Any dropped on the way he must gather up and take back to the original pile.

As he empties the beans into the bowl (or lays on the pile those dropped, if any), he cries "Next!" whereupon the next player in his group goes through a similar feat, and so on until one group has placed all of its beans in its bowl. This group wins the game.

These People Keep Junk Shops

Part of the players sit side by side in a row, each player grasping with his left hand the right wrist of his neighbor, but leaving the neighbor's right hand free. This row is to compete with the balance of the players who sit in a similar row; or if there are a large number, three or more rows may compete.

At a signal, the leader of each row picks up with his right hand an object from his "Junk Shop," a pile placed beside him, preferably in a basket or pan, and passes it to his neighbor, who, of course can grasp it only with his right hand. He

passes it to the next, and so on down the room. In this way an entire series of objects is passed.

Passing the "Junk" Along The row wins whose last player is first to receive the last object; or, if the rows are short, the objects may be re-passed along the line to the first player, and then the row wins whose first player is first to get back the last object.

The sport of the game consists very largely in selecting objects for the "Junk Shop" that are difficult to pass, their variety in size, shape, weight, and other qualities adding much to this difficulty. To make the competition equal, the same kind of objects must be provided for each row. In any home it would be easy to provide two or more of any of the following articles: Book, pencil, newspaper, magazine, sofa pillow, slipper, whisk broom, pin, apple, potato, flatiron, glass of water, piece of cake, empty bottle, tin pail, nut, round, moist piece of soap (last of all).

You Play This with Balloons

(From "Games for the Playground, Home, School and Gymnasium," by Jessie H. Bancroft; The Macmillan Company.)

The game called "Balloon Goal," is played with two toy balloons, preferably twelve inches in diameter, one red and one blue, which are played by being struck with the open hand only. When the gas of the balloon is exhausted, the rubber bag may be refilled with the breath, when it will be found still to float sufficiently in the air for the purposes of the game.

The players are divided into two teams, designated by colors corresponding to the balloons, worn on the arm or otherwise.

Four goals are formed by stretching a tape diagonally across each of the four corners of the room about five feet from the floor, the goals in the diagonally opposite corners having the same colors, two of red and two of blue. The game consists in hitting the balloon with the open hand so that it will float down behind a goal tape, the red balloon scoring when it enters the red goals, and the blue balloon when it enters the blue goals. There are no goal guards, but it is the object of all players belonging to the red team to get the red balloon into the red goals, and of the blue team to keep it out. Similarly, the object of the blue team is to get the blue balloon into the blue goals and of the red team to keep it out.

The game starts by the leader putting the balloons in play by tossing them up in the center of the room, when each side immediately begins to play for them. It has been found that with two balloons and four goals, and the interference offered by furniture, it is unnecessary to limit the players to any given area. This, however, may be done should play become rough.

A score keeper scores one point for each team making a goal with its balloon, but the game continues without interruption, the balloon being at once put into play again by the leader. The team which has the larger score after fifteen minutes of play wins.

The Game of Forfeits

(From "Games for the Playground, Home, School and Gymnasium," by Jessie H. Bancroft; The Macmillan Company.)

Forfeits are used in many games as a penalty for failure, and may be

an occasion for much merriment. The usual method of collecting and disposing of the forfeits is for each player when he fails, to deposit with some person designated for the purpose some article which shall serve to identify him when the penalties are assigned. This may be a ring, some small article from the pocket, a bonbon, a pebble, or flower, a bit of ribbon, or other ornament of dress.

When the game is over, the forfeits are redeemed. For this purpose one player is chosen as the judge, who is seated.

*The Judge
and the
Forfeits*

Behind him stands a player who takes one article at a time from the pile of collected forfeits, holds it over the head of the judge so that he may not see it, and says, "Heavy, heavy hangs over thy head."

The judge then asks, "Fine or superfine?" (Meaning, boy or girl?)

The holder answers, "Fine," if a boy, and "Superfine," if a girl, and adds, "What must the owner do to redeem it?"

The judge then pronounces the sentence. Part of the sport of this imposing of penalties for forfeits is the ignorance of the judge as to who is the owner of the forfeit.

The following penalties are appropriate for the paying of forfeits, the player being required to perform one of the feats described:

Catch Penny.—One elbow is raised level with the shoulder, the arm being bent to bring the hand toward the chest. Three or four pennies are placed in a pile on the bent elbow. Suddenly the elbow is dropped and the same hand moved downward quickly in an effort to

catch the pennies before they fall to the ground.

Chinese Get-Up.—Two persons sit on the floor back to back with arms locked, and retaining such relative positions they try to stand upright.

Pick Me Up.—The performer is required to stand against the wall, drop a handkerchief at his feet, and without bending the knees stoop and pick up the handkerchief.

"Rubber Neck."—In this feat a kneeling performer is required to pick a card up from the floor with his teeth, both hands being behind his back. The card is placed in front of him at the length of his forearm and hand from one knee. This distance is measured by placing the elbow against the knee and stretching the forearm and the hand at full length on the floor; the point which the middle finger reaches is the point at which the card must be placed. The card has the ends folded down so as to rest like a small table on the floor. The nearer edge of it must rest on the line determined as above specified.

The Crawl.—The player is required to leave the room with two legs and come back with six. He does this by bringing a chair with him when he returns.

Spoon Food.—Two players are blindfolded and seated on the floor, each with a large towel or napkin pinned around the neck like a bib. It is well for them to sit on a sheet. Each is then given a bowl filled with corn meal or flour, and a spoon. When all is ready the two players are told to feed each other. This forfeit makes as much sport for the rest of the company as for those engaged in the performance.

Outdoor Plays and Games for Children



Playing "Giant"

This piece of playground mechanism is called the Giant Stride. The children go around in a circle, clinging to the hand bar and touching the ground at wide intervals—taking "giant strides." It is a fine thing for live, wide-awake youngsters and is always popular. Notice the boys at the right who are waiting their turn.

SOME very wise, grown-up persons have written about stories that every boy and girl should know; and others about songs, pictures and poems that every boy and girl should know. Now, there are plays and games that every boy and girl ought to know, and every boy and girl wants to know them. It is just as important that boys and girls should know these games as it is for them to know the best stories, songs, pictures, and poems. So when boys and girls feel in every fiber of their beings that they want to play certain games and spend some

*Importance
of
Play*

time in playing them, wise, grown-up people ought to realize that children, in their love of plays and games, are very wise, too, and that nothing could be better than that they should play,—of course, under right conditions and regulations.

Perhaps first of all, we ought to speak about "right conditions and regulations," for it would be bad if children played games all the time and never worked at other things; or if they played games unfairly, or played evil games and plays; for there is evil in play, sometimes, as in many another good thing in the world when the spirit in which it is done is wrong.

What Games Should Children Play?

What plays and games ought every boy and girl to know? For the most part, they are the old plays and

*Old Games
Are
Best*

games. There are many games made up for the time that are fun to play, just as there are stories that amuse but do not endure. Many of the best games are very old. One need not hunt for new games in order to have good ones to play, any more than he needs to depend upon new books for his reading. Some wise men, like Mr. Culin and Mr. Tyler, who have studied about ancient peoples and savage peoples, think that all our best games were played in simpler forms ages ago, even before

*And How
Very Old
They Are!*

the Egyptian pyramids were built. In a peculiar and efficient way, play acquaints children with the best that man has felt and done; with the joy

of finding out things, learning, making things, creation; keeping pets, nurture, searching for things, discovery; puzzling over things, invention; striving, conquest; joining in games, fellowship; these and many others. All the faculties are exercised, all the deepest emotions are experienced in the plays and games of children, who thus live again, in helpful ways, the life men have lived before them.

What Games Should Be Chosen

This gives the cue to the choice of the best plays and games. They should be related to the best that man has felt and done, and lead with joy and zest into all the fields of human endeavor and achievement, in which we find "the best that has been known and said." In the choice of plays and games, children are often wiser, in a sense, than grown-ups, and more truly recognize their needs. Because they are impelled towards those activities by a natural interest and love, is not a good reason why we should regard pleasure as the chief end of children's play, even in the minds of children themselves.



The Pleasures of the Slide

The slide is always a popular piece of playground equipment. This little girl is amusing herself in a Richmond, Virginia, playground.

Pleasure is not the chief end of children's play. Play is not just for fun. If one wished to inure children to doing hard things, difficult things, even painful things, instead of seeking soft and easy paths, the best way of all would be through play. Much in play is hard and difficult, requiring the sternest standards, resistance of fear, fatigue, and pain. Even little children seek the hardest place in which to walk, such as the curb, or wall, instead of the sidewalk, as every father can testify who takes a little one to walk on Sunday. Boys want to climb trees, not simply sit in the shade of them; they want to run the fastest, not simply run; to dive from the highest places, swim the river at its widest; hit the swiftest pitching, catch a hard, not a soft, ball; throw the farthest, jump the highest, shoot the straightest, wrestle the best, and win the game, if they can, not simply play in it. All this means severest effort, bruises, danger, pain, and fatigue; that boys love it all, does not take away the value of it, but only commends the natural tendencies of the boys.

Play and Life's Activities

Nor is play just for the moment. Many plays and games are preparatory; they look forward to some achievement or result in the more or less remote future. Some plays are accumulative, continuing through many years. Making kites to fly by and by, boats to sail, shacks to play in, practice for a distant game; and collections, for example, to mention only a few, look towards the future as well as at the present. When the Wright Brothers made kites, they kept trying to think how they might make better and better kites—kites that would carry more and more,

and by and by they made the first of successful aeroplanes, without which, now, a great army is said to be as helpless in a battle as blind men in a fight. Instead of being simply for the moment, a play interest often becomes the most enduring and most serviceable thing in a man's whole life.

Nor is play just for recreation. There is recreation in the plays and games of children. Children study better and work harder, so it has always been believed, if they have a rightful amount of play. But play does more than rest and restore one's interest and strength. In the case of children, it develops the organs of the body, the mental powers, and the moral qualities as nothing else can. It even gives more real information, sometimes, than could be acquired in any other way. But these good things result when the play is right and not wrong play.

Many school children who are developed mentally and underdeveloped physically recall Lincoln's familiar allusion to the Mississippi steamboat that had a one-horsepower engine and a two-horsepower whistle; when the whistle blew, the engine stopped. Such children have developed seemingly two-power brains and one-power stomachs, hearts, or lungs. "Walking plays" are some of the best to prevent untimely separation of brain and brawn.

Everybody has noticed how little children like to run down a slanting board, or walk outside the porch rail, or climb along a fence. Older children can get a 2-by-4 joist and fix it, narrow edge up, a few inches from the ground. This is excellent for balancing, walking, and running, and much safer than walking on the railroad track. Another good idea is to

Vast Delight in Simple Sports



When so simple a thing as a seesaw evokes shouts of glee from children, to make them happy for a time at least does not appear to be difficult. And that is the basic idea of the playground movement—that simple, natural and rightly directed activities are the ones from which the child gets the most pleasure and the most benefit.

get an old telegraph or telephone pole and fix the larger end firmly to the ground by driving in stakes and nailing them to the end of the pole, having the smaller end of the pole raised two or three feet from the ground. At a suitable distance from the smaller end must be a rest for the pole, to hold it in the slanting position. The farther the rest is from the smaller end, the harder it will be to walk the length of the pole from the larger to the other end. If the pole is not too large, it wabbles more and more as one approaches the smaller end, and makes the walking increasingly difficult and amusing. On this bit of apparatus ever so many different walking and balancing "stunts" can be done. It may serve in some ways, also, as a gymnasium "horse."

The Giant Stride is another good

piece of play that boys can make, with perhaps a little help from the blacksmith. An old but sound telephone pole should be set about four feet in the ground resting on stones and, if possible, made firm with concrete. The pole should extend twelve or fourteen feet above the ground. Before the pole is put in place, the smaller end should be sawed off square and an iron collar put on it by the blacksmith to keep it from splitting. In this end should be fixed an axle for a small but very strong wheel which somebody will find somewhere and donate for the cause. A plow wheel will do. It is a good thing to have the hub of this wheel rest on an iron plate, so that it will revolve more easily. To the rim of the wheel, perhaps with S hooks, should be securely fastened several strong ropes which reach

*How to
Make the
Giant Stride*

nearly to the ground. If rope ladders can be made for the ends of the ropes, so much the better, but large knots tied at the ends will do. Many stunts can be done on these ropes, several children playing at a time, running, flying about the pole, as though they had not only a giant's stride, but his seven league boots as well. Sharpwatch must be kept to see that all fastenings are sound and safe.

Rope-Jumping, Leap Frog and Hop Scotch

All little children learn to skip, and all boys and girls ought to learn to march. These are good walking plays. It is a good thing to learn to jump rope, but young girls should take care not to jump too long. Leap frog is a game all boys should play, and most boys do play it. It would be a great mistake not to mention Hop Scotch. Hop Scotch is a very old and very valuable game for children. It is played in many forms. It would be a splendid thing for somebody to get up a hop scotch tournament. To do this, a standard form of hop scotch must be decided upon. The following is a good form of the game to use for a tournament.

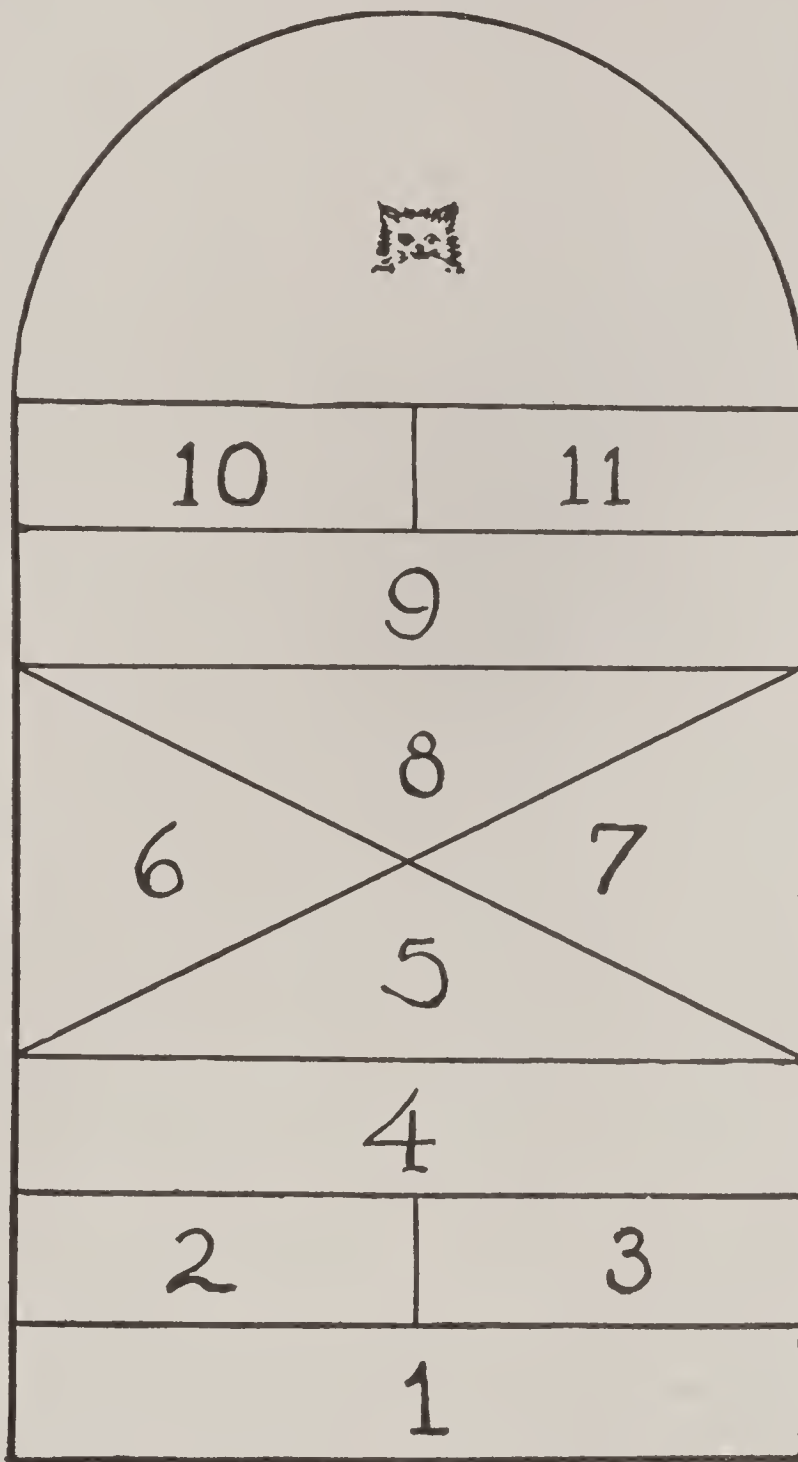
Mark off on the ground or on the pavement, with chalk, a court like the following: A line is drawn at a convenient distance from the court. Each player pitches from this line a

small stone or piece of tile towards the court. Whoever places his stone nearest the first line of the court has first play. The object of the game is to take the stone through the court according to a prescribed manner, as follows: Toss the stone into 1; hop into 1, kick out stone without putting the other foot to the ground; hop out; pitch the stone into 2; hop into 1, then into 2, and kick out the stone as before; hop out through 1; throw the stone into 3 and continue in the same manner as before. This continues until

the player reaches 8, when he is allowed to rest, putting one foot into 6 and one in 7. The player then resumes his play, continuing until he has reached the "cat."

Then, while hopping on one foot as before, he kicks the stone successively into the spaces in reverse order, and finally out. If a player puts the raised foot down, or steps on a line, or kicks the stone so that it rests on a line, or goes out of the court, or

Court for Hop Scotch



into the wrong court, the player is out, and must wait until his turn comes again. Until a player reaches the "cat," he may take as many kicks as he wishes in putting the stone out of the court, and need pay no attention to the order of the spaces. Whoever succeeds in completing the course first, wins.

Such variations as seem desirable, either to make the game easier or more difficult, may be introduced, but before a tournament is held, the game should be standardized and practiced according to the rules agreed upon.

Interest and Profit of "The Hike"

Walking trips, or hiking, are very interesting to both boys and girls. These may be undertaken as excursions to other towns or villages, lakes, mountains, or places of historic or other interest. Country boys who go fishing and hunting have many interesting walks. It is a good thing for boys and girls who live in large towns and cities to organize walking clubs. "Getting up" a walking club is a very

*How to
Organize a
Walking Club*

simple matter. Some one has to think of it, make up his mind to do it, invite friends to his house, talk it over, elect a captain and a scribe, perhaps also some older person, parent or teacher, as an adviser, and the thing is done. A list of tours should be made up. These tours should be not less than two miles nor more than five miles in length, for beginners, although longer trips may be looked forward to later. It is very important for girls to be sensibly dressed for walking trips. They should wear strong, sensible, low-heeled shoes, a skirt of strong, dark cloth, and bloomers of same material. It is well to carry a lunch of plain, wholesome food, such as sandwiches and fruit. Care must be taken that only pure

water is drunk on the journey, and not much of that when one is heated.

When out in the country, the walking club can enliven the journey by singing, particularly marching songs; or by playing "follow the leader." When resting on the journey, mumblety-peg, knife-baseball, and jackstones are capital games.

Climbing, Jumping, and Diving

Climbing is one of the best and most delightful plays of children at a certain age. All children should play at climbing in their early years. For country children, climbing trees, cautiously, climbing and walking along beams in the hay barn, jumping and tumbling in the hay are great fun and a fine training. Children in the towns will find that ladders, poles, and ropes serve a good purpose.

Of course all boys jump; girls should jump, too. Little children like to jump off the steps and chairs. Boys jump off sheds and beams, often foolishly, and injure themselves. Water is the best thing to jump into; and jumping and diving from banks, springboards, and platforms, when in bathing, are the best forms of jumping down. Every boy and girl should learn to dive. But one may not always have water to jump into. Where there are no soft banks to jump from, it is a good plan to dig out a pit in the school yard or playground, or in the yard at home, and fill it with some soft material, such as tan bark, or sawdust, or building sand. This may be used in a variety of ways; for jumping and tumbling, such as jumping from a box or platform, turning handsprings, running jump, pole jump, and others.

Different Kinds of Running Games

There are ever so many running games that boys and girls ought to

play. One of these games is a very old one. As long ago as when Edward III was King of England, the children used to play a game called Prisoner's Base in the avenues of the

game that you will be glad to know, as near as it can be determined, how it was played.

The players chose sides. Each side had a base or home, these bases being

The Relay Race



Relay races develop team work as well as speed and no playground celebration would be complete without one. The picture shows runners finishing one lap and their places being taken by others.

palace at Westminster, and they ran about the avenues so lively and made so much noise that the members of Parliament and other passers-by were quite annoyed. So Parliament issued a proclamation forbidding the playing of the game in the avenues of the palace, and the children had to go elsewhere to play. It is to be hoped that Parliament thought it all out where the children could play, but I do not know whether it did or not. Very likely William Shakespeare played this game of Prisoner's Base when he was a boy, for he speaks of it in several of his plays.

Now, Prisoner's Base is such a good game that it is no wonder that the children kept on playing it, and that it was handed down to us.

There are several ways of playing Prisoner's Base. The way the children played it at the time Parliament could not "hear itself think" because of it, is really such a good form of the

perhaps thirty or forty paces or steps apart. Each side formed a line by taking hold of hands, the line stretching out as far as it could with one player always touching the base. As soon as the lines were formed, the player at the end of the line farthest from the base on one side or the other, left the line as a challenge to the other side to chase him. Then a player on the other side let go of hands also and gave chase. As soon as this second player left his line, another player of the first side set out in turn to chase him, then one from the second side to chase him, and so on as many as wished.

But a runner might chase only the one he first set out to catch. When ever a player tagged another, he scored one for his side and both returned to their bases to set out again when it came their turn in the line. A runner might return to his base whenever he wished, although he had

not tagged anyone or been tagged, but such a course was probably adopted as a last resort, and was in the nature of a retreat. A runner always had to keep his "eyes peeled" because, while he was trying with might and main to tag one runner, he had to look out for the fellow who was chasing him. The one he was chasing might at any instant dodge or turn on his track in a way to put his pursuer in danger of being tagged himself. Of course the players yelled back and forth, shouting warning and encouragement to their comrades and derision at their enemies (saving some breath, however, for running), and no wonder they drowned out Parliament. Well, when the game ended, the side having the highest score won. Sometimes a number was agreed upon before the game began, and the side scoring that number first, won.

Now it may be that the game just described was called "Base" instead of "Prisoner's Base," for there weren't any "prisons," but both names are used by the earliest writers mentioning the games. At any rate, it came about that the form of the game most

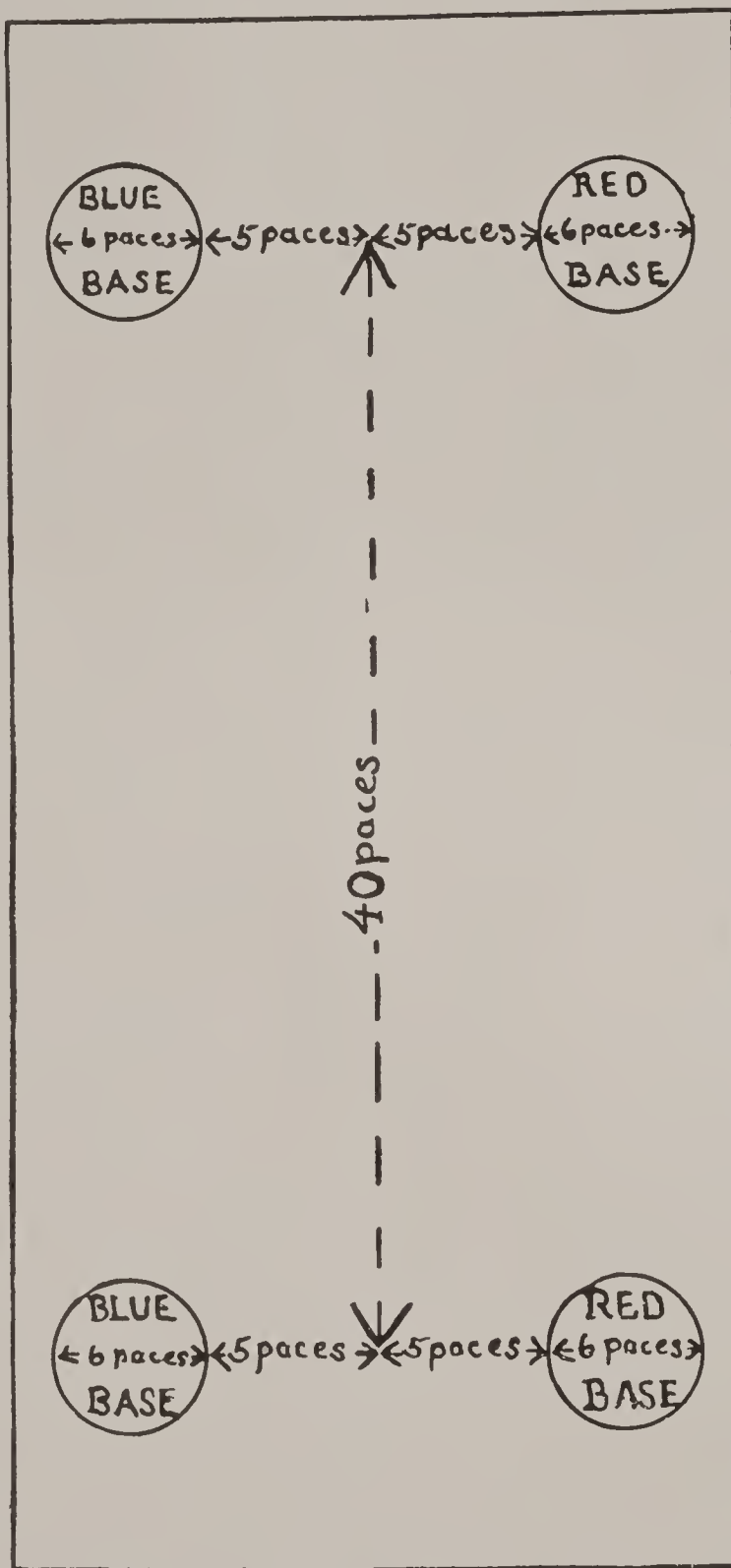
common in this country was the one in which both bases and prisons were used. There have been several methods followed in placing the prisons. The fun of the game depends a good

deal upon whether the prisons are placed so that it is quite possible, but not too easy, either, to free a prisoner. A good way to play Prisoner's Base is to have two bases at one end of the playground (or field of ice, if you are skating) and two prisons at the other end. The bases and prisons may be square or circular in form, but, in marking them out on the ice, it is best to "cut circles" by skating round and round. The bases should be roomy enough to hold the players comfortably and permit ready shifting about for turns at sallies. The prisons may be a little smaller. The bases may be near

together, and the prisons near together, but the prisons should be forty or fifty paces from the bases. The prison for either side may be directly opposite the base for that side, or diagonally opposite, as desired. If directly opposite, the field would be like this:

After the captains and sides (which we may call Reds and Blues) have

Here There Are Two Bases



been chosen, and it has been decided by lot or otherwise which side is to begin the game, the Reds gather in their base and the Blues in theirs. If the Reds are the side to start the game, the captain of that side sends a man to the middle of the field to give the challenge. As soon as this man shouts "Chevy, Chevy, Chase, one, two, three," a player for the Blues sets out to catch him if possible before he can put back to his base. But some other player from the Reds is sent out to protect the first man; then another from the Blues and so on according to wish.

If at any time in the game no one is in the field to be chased, the side last sending out a man to give the challenge may require the other side to take its turn in giving the challenge in the manner followed at the beginning of the game.

A player may tag only those who left their base before he did. When a player is tagged he is put in prison by the one who tagged him, and the tagger is allowed to return to his base without being touched. A prisoner may be freed from prison whenever a player from his side succeeds in reaching the prison without being tagged, and the two are given free return to their base. The game ends if one side is able to put all of the players of the other side in prison and take possession of the other base. This done, the game starts over again. The victorious side has the privilege of requiring the other side to start the game by sending a man to the middle of the field to give the challenge.

Good Training for Football

Prisoner's Base is one of the best games preparatory to football. It trains one for hard, fast running and skilful dodging—two very important things in football. It also trains one

for watchful running, in which one must be on the lookout for those in front of him, to right of him, to left of him, and behind him. Boys who want to become good runners, should remember two or three simple rules. They should run on the balls of the feet, keeping the heels free from the ground. They should breathe through the nose, ordinarily, keeping the mouth shut tight and the teeth clenched; but the mouth may be opened when one is breathing heavily. The chest should be kept high and firm to give the lungs full room, and to induce right breathing. It is very important to try always to start in the quickest possible time when the signal for running comes, and to get into full speed as soon as ever one can. Quickness in starting and reaching one's highest speed has much to do in winning a run.

Strong, healthy boys and girls who run a good deal, naturally run in good form and breathe right, but the rules given will help one who has not a good form in running, to run better. It is very wonderful how one may improve in running. Just as in many other things, some who at first seemed to have no very great promise of ability have finally come to be the very best.

There is one other form of Prisoner's Base that boys and girls ought to know about. The Playground and Recreation Association of America is greatly interested in games for boys and girls, and one of the games which this association thinks should be played all over this country is Prisoner's Base. So, some have tried to find a very good form of the game for matches between the boys and girls of different school rooms, or different streets, or playgrounds, or clubs. Perhaps the very best new form of

the game is the one played first in Baltimore, Maryland.

How They Play Prisoner's Base in Baltimore

In this game there are ten players on a side. The field is divided into two equal portions as shown in the diagram, each half serving as the home grounds or base of one side. Within each half are a prison and two goals. The object of the goals is to invite adventure into the enemy's field. Whoever can get into one of the goals in the field of the enemy, scores one for his side. A player is liable to capture as soon as he crosses the line into the enemy's territory, and if captured must go to prison. A prisoner may be rescued by being touched by a player of his side who succeeds in reaching the prison in safety. Both are then allowed to return to their home grounds, but must pass outside of boundary lines in doing so.

Players are not allowed to pass through or remain in the goals or prison in their home territory. Nor may they pass beyond the side or end boundary lines except in returning home from prison.

The game is played in "two halves"

of fifteen minutes each, with a five-minute period between. Sides change fields for the second half.

At the end of each half, a score of one is allowed a team for each of its players who succeeded in reaching a goal (where he must remain until the end of the half), and a score of two for each of the enemy still confined in prison. The side having the highest total score for the two halves wins.

Duties of Prisoner's Base Officials

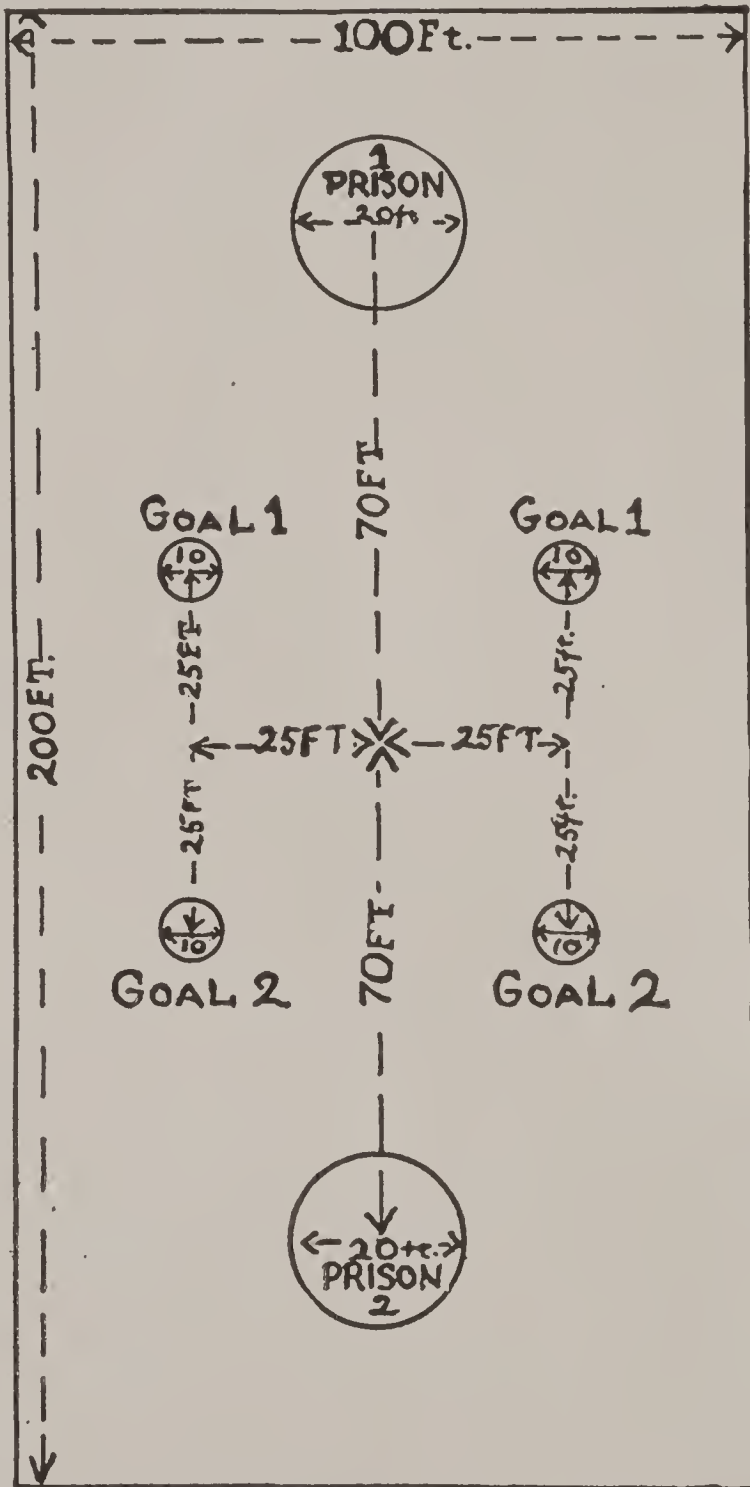
In important matches it is well to have a referee, if possible, two umpires, and a timekeeper. The duties of the officials as laid down in the printed rules are:

REFEREE. The referee shall be the superior officer of the game, shall decide when player is safe in goal, captured or released. He shall have power to make decisions for violations of rules, com-

mitted at any time, including periods when the game may be momentarily stopped for any reason. The referee shall record the points made. His record shall constitute the official score of the game.

UMPIRES. There shall be an umpire in each half of the field. Umpires shall make decision on players being

How Prisoner's Base Is Played



OUTDOOR GAMES

safe, caught, and released, and shall blow a whistle whenever it is necessary in giving such decision. He shall have no power to call time.

TIMEKEEPER. The timekeeper shall be appointed by the referee, and his

out standards which it is thought boys of different ages or sizes ought to be able to reach. Dr. John Brown* of the International Committee, Y. M. C. A., has published a little pamphlet which shows what boys of

Good Sport in a Friendly Spirit



The playground movement has done an immense amount of good in teaching boys to develop their physical strength and skill in friendly contests. One excellent result has been that there is less quarreling and a great deal more real fun. When the wrestling match is held on the playground, fair play is assured, or sticking to the rules of the game is one of the things that the playground insists upon.

record is the *only official time*. He shall note when the game stops and shall blow a whistle indicating the expiration of the actual playing time in each half.

Time consumed by stoppages during the games shall be deducted only on order of the referee. Time involved in returning to home grounds, etc., shall not be considered stoppages.

Measure Yourself by These Standards

Every boy, at least, if not every girl, should practice some of the standard athletic events. There are several associations that have worked

different weight classes might take as standards and how country school children, particularly, might compete with those of other country schools without their actually meeting. The following, adapted with slight change, from "Outdoor Athletic Tests for Boys," will be of interest to every country school teacher, and to every boy who would like to measure his athletic ability by a standard of what a boy of his size might do, if only fair in ability, or good, or unusually good.

*Outdoor Athletic Tests for Boys, by John Brown, Jr., M. D., Association Press, New York.

There are four classes:

- 80-lb. Class, weight 60 to 80 pounds;
- 95-lb. Class, weight 81 to 95 pounds;
- 110-lb. Class, weight 96 to 110 pounds;
- 125-lb. Class, weight 111 to 125 pounds.

If a boy weighs over 80 pounds, he is in the 95-pound class. If a boy is weighed with his clothes on, the weight of his clothes should be taken from the total weight to find his exact weight.

The following are the standards for each Class:

The Standards

<i>80-lb. Class</i>	<i>Passing</i>	<i>Honor</i>	<i>High Honor</i>
Pull up	2 times	4 times	6 times
50-Yard Dash	10 seconds	8 seconds	6 seconds
Standing			
Broad Jump	3 ft. 5 in.	5 ft. 6 in.	7 ft. 7 in.
Running			
Broad Jump	5 ft. 10 in.	10 ft.	14 ft. 2 in.
Baseball Throw	70 ft.	120 ft.	170 ft.
<i>95-lb. Class</i>	<i>Passing</i>	<i>Honor</i>	<i>High Honor</i>
Pull Up	3 times	5 times	7 times
75-Yard Dash	13 seconds	11 seconds	9 seconds
Standing			
Broad Jump	3 ft. 11 in.	6 ft.	8 ft. 1 in.
Running			
Broad Jump	6 ft. 10 in.	11 ft.	15 ft. 2 in.
Baseball Throw	100 ft.	150 ft.	200 ft.
<i>110-lb. Class</i>	<i>Passing</i>	<i>Honor</i>	<i>High Honor</i>
Pull Up	4 times	6 times	8 times
100-Yard Dash	16 seconds	14 seconds	12 seconds
Standing			
Broad Jump	4 ft. 5 in.	6 ft. 6 in.	8 ft. 7 in.
Running			
Broad Jump	7 ft. 10 in.	12 ft.	16 ft. 2 in.
Running			
High Jump	2 ft. 8 ½ in.	3 ft. 9 in.	4 ft. 9 ½ in.
Baseball Throw	130 ft.	180 ft.	230 ft.

kicking, snapping, jerking, or swinging, and bring the chin higher than the bar. Lower the body the full length of the arms, making a slight pause before each Pull Up.

THE DASHES. A good way to "start" is to take the "crouching position." The front foot is placed about six inches from the line; the rear foot being placed so that the knee is opposite the instep of the front foot. The hands are on the line.

<i>125-lb. Class</i>	<i>Passing</i>	<i>Honor</i>	<i>High Honor</i>
Pull Up	5 times	7 times	9 times
100-Yard Dash	15 seconds	13 seconds	11 seconds
Standing			
Broad Jump	4 ft. 11 in.	7 ft.	9 ft. 1 in.
Running			
Broad Jump	8 ft. 10 in.	13 ft.	17 ft. 2 in.
Running			
High Jump	2 ft. 11 ½ in.	4 ft.	5 ft. ½ in.
Baseball Throw	145 ft.	195 ft.	245 ft.
Putting			
8-lb. Shot	15 ft. 6 in.	28 ft.	40 ft. 6 in.
<i>Unlimited Class</i>	<i>Passing</i>	<i>Honor</i>	<i>High Honor</i>
Pull Up	6 times	8 times	10 times
100-Yard Dash	14 seconds	12 seconds	10 seconds
Standing			
Broad Jump	5 ft. 5 in.	7 ft. 6 in.	9 ft. 7 in.
Running			
Broad Jump	9 ft. 10 in.	14 ft.	18 ft. 2 in.
Running			
High Jump	3 ft. 3 ½ in.	4 ft. 4 in.	5 ft. 4 ½ in.
Baseball Throw	160 ft.	210 ft.	260 ft.
Putting			
8-lb. Shot	22 ft. 6 in.	35 ft.	47 ft. 6 in.

Before practicing these events, one should be examined by his family doctor or school doctor to make sure he has no heart weakness or defect that might make the practice injurious to him. After he has been examined and pronounced all right, has been weighed, and knows to what class he belongs, he should practice each event until he can beat the passing standard in all; then try to equal the standard, and so on.

*But See
Your
Doctor First*

THE EVENTS*

THE PULL UP. Grasp the bar with the hands, the feet swinging free from the ground. Raise the body, without

THE STANDING BROAD JUMP. When possible, the jump should be made from a plank or joist, 8 inches wide, sunk level with the ground. The toes must not be placed beyond the edge of the joist. When it is not convenient to have a joist, or "take off" as it is called, the jump may be made from a line on the ground. The jump is measured from the line to the nearest mark made by any part of the jumper's body. In this and other events, generally, three trials are allowed in which to equal or exceed the best mark made.

* From "Something To Do," Vol. 2, No. 2. See Official Handbook Public Schools Athletic League, American Sports Pub. Co., New York.

Lively Times in the "Swimming School"



Here you see a party of people having a grand time in the water, paddling about, swimming, and learning to swim. Every boy and girl should know how to swim, and swimming opportunities should be provided for girls as well as boys.

RUNNING BROAD JUMP. In this event there is a running start. The same rules as to toeing the line and measuring apply in this, as in the standing broad jump. The ground should be dug up to give a soft landing and should be smoothed over after each jump.

BASEBALL THROW. The thrower is allowed to run fifteen feet in throwing the ball, but he must not step over the starting line.

RUNNING HIGH JUMP. The jumper may run any distance and from any direction.

SHOT PUT. The shot is put with one hand which may be raised above but not drawn behind the shoulder. The put is made from a circle seven feet in diameter. One may not touch the front part of the circumference in making the put, or step beyond it. In athletic meets, a wooden stop-board

is placed in the middle of the circumference of the front half of the circle. This may be touched with the foot but not stepped upon.

How the Points Are Scored

A good game may be played by a group of boys individually or, better still, on sides. Each boy, or each side, scores points in accordance with the following scale: For each Pull Up better than Passing standard, 25 points. For every half inch better than Passing standard, in the Standing Broad Jump, 8 points. For every inch better than the Passing standard in the Running Broad Jump, 1 point. For every quarter inch better than the Passing standard in the Running High Jump, 1 point. For every foot better than the Passing standard, in the Shot Put, 1 point. By this scale one scores just 100 points by equalling

the High Honor standard. This suggests an interesting way a boy may keep track of his progress by noting his scoring day by day. It also suggests how different groups, or classes, or schools, may compete and compare their scores to see who wins.

Girls from ten to twelve may safely practice the running and jumping events for the 80-pound class and the 95-pound class.

Do You Know How to Swim?

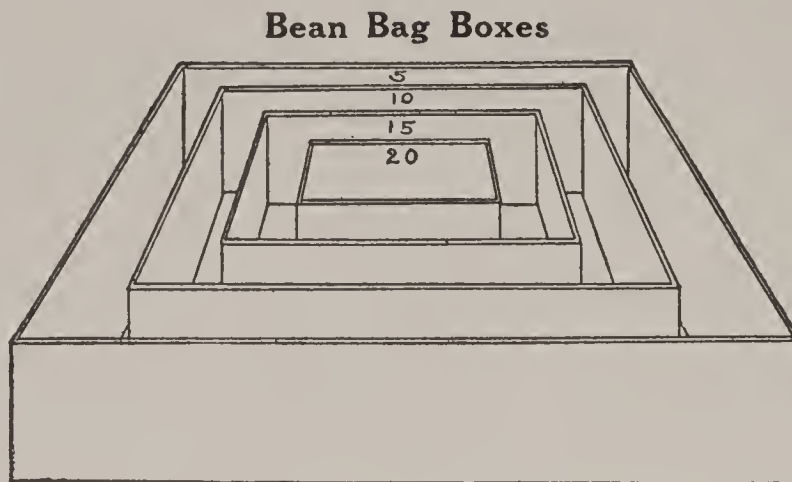
Every boy and girl should learn to swim. Not many schools have swimming pools, and many towns have no places where any but boys may learn to swim. And where there are "swimming holes" they are often dangerous or insanitary. Every village large enough to support schools should make it possible, at least through improvement and regulation of natural swimming places, for children to learn to swim. A teacher, or parent, or the children themselves, might start a movement for providing a suitable place to swim, in every community where there is clean water in stream or pond.

Various Kinds of Games

Of course every child has a ball to play with some time in his life. Tossing and catching, passing, or playing with another, bouncing against the wall and catching in various ways, school ball, where one is the leader and each child has to catch the ball in turn just as the leader, are all simple but very valuable ball plays for children.

Anyone can make a bean bag. It may be used in some ways like a ball, and in some ways better than a ball. Bean bags should be three or four inches wide and four or five inches long. They should weigh about six

or eight ounces. One of the best games with bean bags is to toss them at two or three boxes, of different sizes, each smaller one placed within the next larger, as shown in the cut.



The players toss or throw the bags in the smallest box. If the bag misses the smallest box, it may go into the next larger, but the smaller the box, the higher the score. Set a number as the score. Whoever makes the given number of points first, wins.

For "ring toss," make rings by twisting reeds, or make them out of three-quarter inch manila rope. They should be about six inches in diameter. These are tossed at a stake driven in the ground or one fixed in a hole in the middle of a small board. The players take turns in shooting three rings, one after the other, at the stake, trying to "circle" it, until one player has a score equal to the number agreed upon.

For "horseshoe quoits," get four horseshoes of the same size and weight. These are "pitched" at a stake from a distance suited to the size of the players. Each player pitches two shoes in turn. A player scores as many points as he has shoes nearer the stake than any shoe of his opponent. Either two or four may play at a time. This is an excellent game with which to start a tournament at school.

New Jersey Boys Pitching Quoits



Pitching quoits was a favorite game with Greek youths and had an important place in the Olympian celebrations. Skill and strength are required in pitching quoits and some of these playground boys of East Orange, New Jersey, have become experts in their use.

Marbles is another game that ought to be mentioned here. The game has greatly degenerated, but if any teacher would start a marble tournament, he would find a lot of good in marbles, and that boys could be induced to play the best, rather than the poorest games. Once a man hated to see "marbles going to the dogs." So he got up a marble tournament. More than two hundred boys entered the tournament, and it took several weeks to play the games. There was great interest, and men stopped and watched day after day.

This is the way he started the tournament. Boys signed up by the score. Then a standard game was decided upon, rules agreed upon, players were paired off, schedules were made out and posted, and the games began. Each player was furnished with a bag of twenty "commies," when his turn came to play, but he used his own "alley," "steelie," or whatever he called it. The small

ring game was played, each player putting a "commey" in the ring and the first plays were made from a line drawn at a distance from the ring. The boy who won the others' twenty marbles handed his bag with forty marbles in to the scorekeeper. Meantime all the boys were playing practice games, getting ready for their turn in the tournament.

About Tournaments in General

Tournaments have been suggested so many times that it seems wise to speak a little further in regard to them. Tournaments have been used very rarely in such games as hop scotch, marbles, mumblety peg, jackstones, tops, and other very familiar games of skill of children. A tournament adds greatly to the dignity of the game and to the interest. A school may be on the high edge of interest and healthful enjoyment of a good game for several weeks through the influence of a tournament. But children have not the organizing

Basket Ball and Good Citizenship



Under a physical instructor who acts as umpire, lawless gangsters of the tenements learn to play basket ball. They learn that to be a good basket ball player one must do good team work and abide by the rules of the game. And so basket ball becomes a means of making good citizens of them. For good citizenship means doing the same things they do in basket ball, only on a larger scale; democratic self-government is based on team work or co-operation and playing the game squarely.

power, usually, to inaugurate and carry out a tournament, even if one of them should happen to think of it. It requires some older person, preferably the teacher, to do this.

The organization of a tournament, however, is quite simple. A tournament in any game should be started during the season when the game is taken up spontaneously by the children. It is best to have the affair managed in as democratic a way as possible, officials elected by vote, and committees regularly appointed. The standard for the game has to be decided upon, rules definitely formulated which are to control the game and the tournament. There must be those who are responsible for the different things necessary—schedules, materials, getting grounds ready, starting the play, judging, umpiring,

scoring, keeping records. The legislation involved in conducting a tournament is of such high value that it is worth while from the standpoint of civics alone.

When the number entered in the tournament is not large, each may play all the others. When a good many play, it is better to have a method of eliminating those who are beaten in the first, or "preliminary," games.

Development of Social Qualities

But there are other needs of boys and girls than good health and mental control. The kinds of games already described tend to develop certain moral and social qualities, such as courage, self-respect, admiration of skill, desire for efficiency, sense of justice, love of fair play, and resentment at unfairness. But every boy

A Folk Dance by Little Folks



Of late years folk dances have come into their own in the play life of the child. Representing the play spirit of an earlier period in the life of the race as they do, their rhythm and dramatic movement appeal most strongly to children. Folk dances were accompanied by singing. Notice how each dancer is singing to her neighbor and emphasizing her remarks with her forefinger.

and girl should also know the plays and games that develop especially the gentler qualities of sympathy and sociability. They should know the traditional singing games, folk plays, and folk dances, like Looby Loo, London Bridge, Jenny Jones, Go Round and Round the Village, and others. Young boys like to play these games as well as girls; they are eminently sociable, and further the development of social graces. Then children should take part in the many plays that broaden their personal experience, place them in contrasted situations, help them to imagine themselves in another's place, and to act well their part in the undesirable as well as desirable; in being "it" and not being "it." These include games of imitation and imagination, playing school, doctor, Indians, policemen, cowboys, expressmen, firemen, soldiers; also games of tag, I spy, blind man's bluff, duck on a rock, hill dill, hot cockles, and many others.

Developing the Team Spirit

There is still another kind of game that every boy and girl should know. While the plays and games already mentioned are valuable in furthering many desirable social qualities, there are some games that develop especially team spirit, loyalty, willingness to co-operate and to sacrifice individual prominence for the good of the group. These are the team games of high organization, such as baseball, football, basket-ball, hockey, and others. These games are well known to every boy and will not be described. Under ordinary conditions, modified forms of these games and games of simpler organization will be mostly played by children. Some of these will be suggested.

Practically all American boys play baseball in some form. When there is no opportunity for playing regular baseball, or simpler game with hard ball, much fun and profit come from playing with a soft ball. So-called

*Modified
Baseball
Games*

playground balls are now sold which are not dangerous to windows or to passers-by. They are well made and as serviceable as a baseball, except that they are not hard. A game practically like baseball may be played, the diamond being considerably smaller. This game played with a playground ball and the size of a regular baseball, makes one of the very best games for girls, as well as for boys.

Long ball is another modified ball game of great interest. In this game there are two bases, home base and long base, which is placed beyond the pitcher in a position corresponding to second base in regular baseball, but not nearly so far away. Pitcher and catcher take the usual positions, but the other players scatter about the field. Every hit is fair. There are just three ways of putting a player out: (1) by catching a batted ball before it touches the ground; (2) by tagging a runner between the bases with the ball; (3) by hitting a runner with the ball when off a base. A batter has three strikes only, but is not put out if the catcher catches a missed third strike; he must be touched or hit with the ball before he reaches long base. There may be any number of runners on long base at the same time, but there must always remain one player at home to bat, otherwise the side is out. A runner may not return to any base after he has left it to run home. In running home he may be allowed to run zigzag over the field. There may be any number of players on a side. Scores are counted as in baseball, and three outs retire a side.

Just as there is a game called indoor baseball and a game known as play-

ground ball, so there is a game called indoor football, or it may be played outdoors and called playground football.

The field may be of any convenient size. A goal is set up or marked off at each end of the field. A good way to set up a goal is to put up jumping standards with a string or stick across them. To score a goal, the ball must pass between the standards and under the string. Simpler goals may be devised; or even simply marking off the field to indicate space where the ball must be forced through, will serve the purpose.

A basket-ball or volley-ball may be used. There may be any number of players on a side. The ball is put in play by being tossed up in the center as in basket-ball, or by being faced as in hockey.

The ball may be thrown, batted, kicked, dribbled, or rolled. There are no boundaries and the play is continuous until a goal is made, unless stopped by a scrimmage, held ball, or foul. In case of scrimmage or held ball, the ball is put in play again by being tossed up as at the center. Running with the ball, holding, and tripping are fouls. A foul scores one point for opponents. A goal counts two points.

A great number of other plays and games might be mentioned, but the boys and girls who know and play the games that have been suggested, who play them in the right spirit, and who attain to a high standard in them, will surely have good bodies, great mental control, strong rugged characters, and the finer social qualities—and such are pretty sure to grow up into healthy, wise, and industrious men and women.

THE ADVENTURES OF BETTY AND BOBBY AND BILLY AND TEDDY



in the
Land of Muchenplentie

Science craved speech with youth one day,
And sought the playground, babes to find.
They cried, "A Witch!" and ran away,
Not one dared even look behind.

Thought Science, "Is my face so grim
That children, recognizing it,
Fly like scared birds? I'll just ask *him*
To help me in disguising it."

He was just a motley vagrant
Pleased with the jingle of his bells,
And Science saw how children flew
To hear the tales that Folly tells.

"Lend me," she said, "that suit you wear,
That I may speak with children too.
This cloak of mine creates a scare;
In your attire they'll think I'm *you*."

So Folly lent his cap and bells:
He loved the children, and he knew
That stories such as Science tells,
Delight the folk she tells them to.

But Science, when she put them on,
Found out at once they did not fit.
"Why," cried she, "did I motley don?
I don't resemble you a bit!"

"It's sad," said Folly, "but it's true,
In motley garb you don't look well.
Stay: I'll pretend that *I* am *you*,
I'll tell the tale *you* want to tell!"

Adventure the First

They Meet the Little Old Man of the Wood

THERE was once a little girl who lived at the edge of the wood with her father and mother and little brother. This little girl's name was Betty, and her little brother's name was Bobby. Now Betty was a very kind little girl, and because she was older than her brother, she always tried to take care of him and keep him out of mischief; but Bobby, like all little brothers, just couldn't keep out of trouble, especially when Billy was along, for Billy was Bobby's dog, you know. He wasn't exactly a dog either, for he wasn't quite old enough. He was just a puppy, and the two of them, Bobby and Billy, kept Betty busy most of the time, straightening out the tangles they got into.

I don't know what Betty would have done if she hadn't had her Teddy Bear to tell her troubles to. She always knew just where to find Teddy and he would sit by the hour and listen to whatever she had to say. When she was through or asked him a question he would just sit there and look wise and wink his eye knowingly, as much as to say, "They'll have their lesson some time." People said that Teddy didn't wink at all, but Betty said he did and Betty ought to know because she knew him better than anybody else, and since they were such good friends, you know, Teddy might have

winked for her when nobody else was around.

I said that Betty lived at the edge of the wood. Well, this wood was made up of great big trees with gnarled branches and tangly, knotty roots, and grew all over the mountains right back of Betty's house; and what good times Betty and Bobby and Billy and Teddy had rambling over and around the rocks and woods.

Betty's mother said that people used to say fairies lived in those woods, but nobody believed it any more. Betty told Teddy lots of times that she thought maybe fairies really did live there yet, but wouldn't show themselves, just because people didn't believe in them; to all of which Teddy gave an unusually long wink, and by that Betty knew that Teddy was quite sure of it.

Bobby and Billy Make a Discovery

One day they had all started out to the playhouse; Billy had run on ahead to see if he couldn't find something to bark at, and Bobby was following as fast as his short little legs would carry him, leaving Betty and Teddy to come along as they pleased. Betty was running here and there, picking flowers and thinking what a nice bouquet she would take home to mother, when she heard Bobby calling.

"Those children must be in trouble

again," said Betty, "so I suppose we'd better hurry over and see what we can do, Teddy." Teddy gave a very short wink which meant he too thought they'd better hurry. So hurry they did and without much trouble they found Bobby at the foot of a big tree that the wind had blown over. Billy was down among the roots, tugging and jerking at what seemed to be a piece of cloth stuck into a hole. It was pretty dark down there and Betty couldn't see very well, but she seemed to hear someone grumbling and scolding and making a terrible fuss; but Billy kept on tugging and jerking and growling, and growling and jerking and tugging, pulling the piece of cloth out farther, and each time Betty seemed to hear the voice more plainly.

All at once out backed Billy, cloth and all, shaking it for dear life, and when out of the hole he started whirling 'round and 'round in a circle as fast as he could go.

"Stop that! Let go my coat! Let go, I say. Help, somebody, before he shakes me to pieces!"

Bobby couldn't say a word, he was so surprised and Betty could only say, "Billy!" So Billy, thinking that everything was all right, stopped his wild running around and sat back on his haunches panting, his head first on one side, then on the other, as if he didn't know whether to believe his eyes or not. And what do you think he saw? Why, he had pulled out of that hole the funniest little old man you can imagine. He was just about as tall as a foot rule. He had on a long green coat, so long that the tails dragged on the ground, wore brown knickerbocker breeches tied with red ribbons at the knees, brown shoes,—and what big feet he had! His hat, which he had just put on his head, was green and black, and almost

as tall as he was, and out from under it peeked a pair of very sharp gray eyes, over which he wore some very googly spectacles. His cheeks were round and rosy, and his beard was very white and long—so long that he had wrapped it around his waist. He carried a crooked cane and had a big, heavy chain across the front of his waistcoat, to which hung a very mysterious looking charm.

The Little Old Man With the Tall Hat

"Well, I guess I'm all right," said he, shaking himself and wiping his face with a very large blue and white handkerchief. "That dog meant well, but he was pretty rough. Funny thing a dog doesn't know when to stop. A little bit more and I am afraid I should have been angry." Then he began feeling about through his pockets, as if in search of something.

Billy kept on looking at the little old man very curiously. Bobby looked at Betty and Betty looked at Teddy, and Teddy winked a very knowing wink, as much as to say, "There! didn't I tell you?"

"Oh, yes, I thought I had one," said the little old man, drawing from one of his coat pockets a very smooth, flat, dried leaf.

"Madam, my card," said he, handing it to Betty.

By this time Betty was feeling more at ease, so she politely took the card and read:

HIS MAJESTY, MR. B. A. GRUMPELKIN
King of All
THE BIZZIE-HAPPY FOLK
In the Land of
MUCHENPLENTIE

"I'm certainly pleased to make your acquaintance, Mr. Grumpelkin," said Betty.



"Stop that! Let ợo my coat! Let ợo I say. Help!, somebody, before he shakes me to pieces." ~ ~ ~

"Well, I hope you are,—you ought to be," said he, more to himself, it seemed, than to Betty. "I want to thank your brother for having his dog pull me out of that hole, even if he was rough about it."

"Oh, you don't need to thank me," said Bobby. "I didn't have him pull you out—I didn't even know you were in there."

"Well, after this you want to keep your eyes open," said the little old man, gruffly, a little bit hurt, it seemed.

"You see," said he, "I was coming along here and met Mr. Woodchuck who lives under the tree there. We were joking, he and I, and he thought he'd play a trick on me, so he took my hat and ran into his house with it—he knew I couldn't get along without my hat—so I went in after it, and got fast, and if your dog hadn't come along just when he did, I'm afraid I shouldn't have gotten out."

"Well, how funny," said Betty.

"I can't see anything funny about it," said the little old man.

"Oh, I didn't mean that way," said Betty. "I meant how funny of Mr. Woodchuck to take your hat."

"We're old friends, the Woodchuck and I. I come over to visit him quite often."

"It is strange we never saw you before," said Bobby.

"It is, and it isn't," said Mr. Grumpelkin. "You see, I don't care to mix with Humans very much, so when I see one coming, I hide until he gets past."

"Where did you come from?" asked Bobby.

"Where did I come from?" repeated the little old man sharply. "If you'd look at that card you could see. Young man, you want to learn to use your eyes more."

"I was just wondering," said Betty politely, coming to her brother's rescue, "who the Bizzie-Happie Folk are and where the Land of Muchenplentie is."

"I can't very well tell you," said the little old man, "but if you'd like to go there, I think I can arrange it so you can do so."

"Oh, wouldn't that be lovely," said Betty and Bobby together, dancing around Mr. Grumpelkin; and Billy barked and Teddy winked very slowly twice.

The Charm That Brought Mr. Grumpelkin

"There, there, don't get so excited," said Mr. Grumpelkin. "I must hurry along now. You have done me a great favor today, so if at any time you need me, just let me know. Here is something that will always call me," said he, unfastening his curious watch charm and giving it to Betty. "Take good care of it, for if you lose it or ever tell anybody about it, it will disappear and you will never see me again. Whenever you want me, rub your hand over it three times and say

'Oh, Mr. Grumpel—
Grumpelkin,
Come to us
As quick as you can'

and I shall be there."

Betty was going to thank him, but he was gone. She rubbed her eyes and so did Bobby, and Billy looked foolish and Teddy just looked solemn. But she still had the charm in her hand to prove that they hadn't been dreaming. The next thing was to find a place to hide it so no one would see it, and yet so they would always have it with them. Bobby had a bright idea. He took his knife and cut a very neat pocket right in Teddy's back, because Teddy couldn't feel, you know, and put it in there.

Then they all went home. They were anxious to tell mother all about the little old man, but mother just smiled as if she didn't believe it, and when Bobby told father about it he said, "Now Bobby, you must never tell anything that isn't true." So

since neither father nor mother would believe it, and since they had no way of proving what they said, except by showing the mysterious charm, which they dared not show for fear it would disappear, they decided not to say anything about it again.



He said "Lead on," to the Imps who had been waiting; and Bobby held to the string and Betty held to Bobby and carried Teddy, and so they set out through the wood

Adventure the Second

Off to the Land of Muchenplentie

IT was the very next day. Betty had helped mother wash dishes, she had put Dolly to bed and all her playthings away, when mother told her that she and Bobby might go out to the woods for the afternoon, if they wished, and, of course, the children were very glad when mother said that for they thought they might see Mr. Grumpelkin again.

Well, they took some cookies and apples and some toy dishes for the playhouse and set out for the woods, soon reaching the playhouse safe and sound. Betty told Bobby that he would have to cut some brush for brooms so she could sweep, so he and Billy went, leaving Betty to put the dishes in the cupboard and tidy the house.

Betty soon had everything in order and told Teddy to keep house while she gathered some peppermint for their play dinner. She was gone for quite a while and when she came back, there was Teddy, just as solemn as you please, but no Bobby. "I wonder where the boys could be," said Betty.

She had no more than said it—Teddy hadn't even time to wink—when she heard Billy and Bobby set up the most awful din, over through the woods. First Billy barked, then yelped and whined and yelped some more; then Bobby started crying and calling for help.

Betty grabbed Teddy by one leg and started out in the direction of the cries as fast as she could go, and all the time Billy was yelping and whining and Bobby was crying. Just as she went around a big tree she saw them coming toward her—and such a sight!

What Happened to Poor Billy's Nose

Between cries Bobby told her what had happened. He had cut the brooms and they were on their way back when Billy discovered a big round ball that looked just like a great big pincushion. He saw it move just as they came up, so he thought he would catch it. Heranat it and just as his nose touched it—Ouch! He jumped back, but too late; his nose was full of long, sharp quills, and oh, how they hurt. He yelped and whined and Bobby, seeing what was wrong, tried to pull them out, but got some in his hands.

Betty was almost beside herself and hardly knew what to do; she looked at Teddy. He was lying on his face where she had dropped him. But the pocket in his back caught her eye and right away she thought of the little old man. She quickly took out the charm, and rubbed it three times, saying:

"Oh, Mr. Grumpel—
Grumpelkin,
Come to us
As quick as you can."

She had hardly finished saying it, when there was a sound of voices coming closer and clearer all the time—

*A—a—a—long tail coat
And a silk cravat,
Black buckled shoes
And a big tall hat;
He isn't tall
And he isn't fat.
And he has a big cane
That goes rap, tap, tap—
We can't tell more,
But what of THAT!*

and at the word "that," there plumped right down in front of them, two of the most comical little Imps you ever heard tell of. They were so funny that Billy forgot his pain and Bobby started to laugh.



Bobby nearly jumped out of his shoes and Billy turned around so quickly that he nearly fell over, and there, just as if he had been there all the time, stood Mr. Grumpelkin.

**And Sure Enough There Was
Mr. Grumpelkin!**

"Well, what are you laughing at now?" said a gruff voice at his heels.

Bobby nearly jumped out of his shoes and Billy turned around so quickly that he fell over, and there, just as if he had been there all the time, stood Mr. Grumpelkin.

"It would seem that you have nothing to do but laugh at people, young man," said he to Bobby. Then, turning to Betty, he said, "What do you want with me?"

"Oh, sir, I'm sorry I bothered you, Mr.—"

"No bother at all, just tell me what you want," said Mr. Grumpelkin.

"See those horrid quills in Billy's nose and Bobby's hands," said Betty. "They were hurting them so badly that I didn't know what to do, so I called you."

"Quite right, quite right," said the little old man. "Proper thing to do. Serves them right though for meddling in other people's business."

By this time Billy's nose was swollen up to twice its real size and Bobby's hand was paining him badly.

"They helped me out yesterday, so I'll help them today," he said, and with that walked over to Billy and pulled the quills out of his nose one by one, and when they were all out, Billy's nose was just the same as if nothing had ever happened to it. Then he pulled the quills out of Bobby's hand, and it was well again.

"Thank you," said Bobby.

"Now that is better," said the little old man. "I was beginning to think you had no manners at all."

"I think it is wonderful, the way you pulled those quills out," said Betty.

"Oh, that's nothing," said Mr. Grumpelkin. "We do things like that in my kingdom every day."

"When will you take us to your kingdom, Mr. Grumpelkin?" said Betty. "You know you said yesterday you would sometime."

"Well, let's see," said the little old man, pulling out a great big watch with funny figures on it. "I guess we would have time to make a short visit yet today, if that dog of yours will mind his own business. If he doesn't, it will go pretty hard with him," he said to himself.

"We will have to blindfold you, though," said he to Betty.

Off for the Kingdom of Grumpelkin

So he blindfolded all of them till they couldn't see a thing, then tied a string to Billy's collar for Bobby to hold to, and taking Billy by one ear, he said, "Lead on," to the Imps who had been waiting; and Bobby held to the string and Betty held to Bobby and carried Teddy, and so they set out through the wood.

They had only been walking a little while, Betty thought, when the old man said, "Here we are, you may as well take off your blindfolds," which they did; but they were in a part of the wood where they had never been before. The trees seemed to be gnarlier, the grass seemed greener, and the hills steeper, and right at their feet between the roots of a big tree they spied a tiny stairway.

"This is the entrance to one part of the Land of Muchenplentie," said Mr. Grumpelkin. "If you are all ready we will start—"

"But we can't get down that stairway," said Bobby.

"There you go again," growled the little old man. "Didn't I tell you to use your eyes and ears more and not to talk so much?"

"Don't be frightened at anything that might happen, because nothing will harm you. Now, are you ready?" said he.

"Yes," said Betty.

"Yes," said Bobby, but it sounded as if he had shouted.

"Woof," said Billy, and it sounded so loud they thought it would split their ears.

Then everything seemed to get big, the trees stretched out and the stairway grew and grew until the steps were big enough to walk on and a funny thing was Teddy seemed to grow too, until he was bigger than Betty.



And with that he was off on a jerky, wobbly Teddy-bear dance and Bobby just gasped and even Billy forgot to bark, he was so surprised.

"Now, I guess we are ready to go," said the little old man. "You see, I had to make us all so small that we could walk down these steps."

"Then things didn't really grow at all, but we were just getting smaller," said Betty.

Then Teddy Bear Started to Talk!

"Yes, and I stopped getting smaller before the rest of you did," said a new voice at her elbow, and would you believe it? Teddy was talking to her.

"Why Teddy!" was all Betty could say.

"It is rather queer to hear me talking, isn't it?" said Teddy. "You see, since there are no Humans bothering around now, I can talk as much as I want to. Heigh ho! It's good to be somebody again. We'll show this brother and his dog that Teddy is not so dumb as he looks, won't we?" and with that he was off on a jerky wobbly Teddy bear dance and Bobby just gasped and even Billy forgot to bark, he was so surprised.

"We are now in the Land of Muchenplentie," began Mr. Grumpelkin. "This is my kingdom; I am the ruler of all the Bizzie-Happie Folk. We call ourselves that because we are always busy and when we are busy we can't help but be happy, you know. My people do more work than you Humans ever dreamed of. We keep the soil loosened up, mix decayed leaves with it and oh, ever so many things — There! — someone is calling me. I must leave you for a while, but I shall be back shortly. Don't go far."

Mr. Grumpelkin had just rounded a bend and the sound of his footsteps was dying away, when they heard short, quick, clicking steps from another passageway which adjoined it at this point.

They all looked in the direction of the sound, and soon they saw coming

around the bend three very strange and ugly creatures. They were hurrying along, neither looking to left nor right, but talking among themselves as they walked.

The children not knowing who they might be or whether they would harm them, crouched up against the wall, so as not to be seen.

Strange Creatures from Under the Ground

As they came closer they heard one say, "I was just digging up to where I thought there was a nice, juicy root, when all of a sudden everything gave away and things became so bright I couldn't see at all, and of all the strange sounds, why my ears hurt yet from it."

"Why didn't you look around to see what was taking place?" said another.

"Didn't I just tell you that I couldn't see because the light was so strong? And besides I was afraid I might fall off if I didn't have something to hold to."

"I don't think you would fall off," said the other. "It has been a long time ago and I don't remember very well, but it seems to me that I lived up there in the light for a while."

"Yes, I remember something about that, too," said the first one, "and as I remember, I didn't like it, so came down here."

"I am getting rather tired of this place," said another; "I believe I have been here too long. I don't have much of an appetite any more."

"That is just the way I feel," said the second, "I don't eat nearly as much as I used to, things don't taste right, and I keep getting more restless all the time. I feel very queer."

"Hello! what are these things over here?" exclaimed the first one, catching sight of the children; and at that they all three gathered around them.



They were hurrying along, neither looking to left nor to right,
but talking among themselves as they walked ~.~.~.

"Who are you?" asked the first one, looking at Bobby sharply.

"My name is Bobby," he replied a little bit frightened, "and this is my sister Betty, and over there is my dog Billy."

"You don't look very strong," he said. "Rather weak shells you are wearing. They are not waterproof either. Are they? Well, you won't get along here very well."

"We are just down on a visit. We came from above ground and are

going back up there before long," said Bobby.

"How interesting," said the first. "Then one can live up there; and one won't fall off?"

"Well I should say not," laughed Bobby. "You couldn't fall off, unless you fell up and you can't fall that way, you know. That is the only place in the world to live, too. It is nice and light and dry most of the time. You ought to come and try it."

"Well, we must do something pretty soon," said the second.

"We are getting so tired of living down here that we don't know what to do. We can't eat, we can't sleep, just feel restless and stuffy all the time. I feel that there is a big change coming over me, but I'm going to see some of the world before anything happens. Thank you for the information, we might see you up there some day"; and as they moved off, the children heard the third one say: "Right down this way is a specially good tender root; it has a nice spicy flavor that

I think you'll like even if you aren't very hungry."

"I wonder who they are," said Bobby. "They look funny, don't they?"

"Yes," said Betty.



Betty looked in the direction he was pointing and saw Teddy backing towards them dragging a very heavy object much larger than himself.

"And did you notice how old they look? I don't believe they will live long."

"This is a queer place, isn't it?" said Bobby, as they heard the echoes of their voices.

"Hello! look at Teddy," he exclaimed, pointing down the passage. I wonder what he has there."

Teddy and His Funny Find

Betty looked in the direction he was pointing and saw Teddy backing towards them dragging a very heavy object much larger than himself.

"Phew! That's hard work," said Teddy, as he came up to them.

"Better rest a bit," said the lazy voice of the thing he was dragging.

"What have you there?" asked Bobby.

"Why, this is a fellow who got off the track, and I am helping him out. He was trying to get to the top of the ground, but got into this tunnel, and since he didn't have anything to push against, once he got in here he couldn't go any farther. He was about to give up in despair when I happened along."

"Well, it is pretty hard to tell where you're going when you have to go backwards all the time," weakly replied the Thing. "And, besides, it is very hard to get around in this coat of armor, and very slow going too, after being used to move around so freely as I used to."

"Who are you anyway?" asked Bobby.

"I am too tired to tell you now, besides I must get up to the daylight. Are you rested now?" the Thing asked of Teddy.

"Yes, I guess I can take you the rest of the way. It is quite lucky that you have this handle on your armor; if it weren't for that I fear I couldn't help you along very well," said Teddy, as he grasped a sort of

handle at one end of the Thing and began pulling again.

"Don't go far from the entrance," called Betty. "We shall have to wait for Mr. Grumpelkin; then we shall be out too."

"Well, well, well! Did you ever! Come here, children, and see what funny people are out in our front yard. Now, what do you think of that"; and a strange-looking old woman with a lot of queer-looking children came towards Betty and Bobby. Bobby became uneasy, but Betty reminded him that they needn't worry, because Mr. Grumpelkin had told them nothing would harm them.

"Who are you, anyway, and where did you come from?" asked the queer old woman of Betty in a business-like way.

"I am Betty, and this is my brother Bobby, and this is his dog Billy. Mr. Grumpelkin brought us here."

Strange Sights in the Land of the Ants

"Oh, then, that's all right, if Mr. Grumpelkin brought you," said the old woman. "I am Mrs. Ant, and these are some of my children."

"May we come in for awhile?" asked Betty.

"Yes, but if you want to do any talking you will have to follow us,—you know we have no patience with people who don't work. Come on in, you'll find our house always tidy."

Upon entering the ants' house—or city, as the children would have called it—they found it made in stories, each one divided into sections and compartments.

They watched the ants as they went about their work, and noticed that they all seemed to have something to do and were working as if afraid to lose a moment's time.

"What are all these people doing with the bundles?" Betty asked, as



"Yes, these are our cows," said Mrs. Ant. "You might call them Plant Lice, but they give delicious milk through those two horns you see on their backs. They are milking them now. We like this milk so well and it is so nourishing that we always keep a herd of them."

they came to a passageway that was blocked with a continuous stream of ants carrying white bundles as large as themselves.

"Those are my younger children," said Mrs. Ant. "They look like white bundles to you, I know. You

see, after they hatch and are fed and cared for by the nurses for a few days, they spin cocoons of fine silk for themselves where they sleep for a time until they are ready to come out as real children, soon to grow strong and help with the work.

"The nurses have had them up here during the warm part of the day, but now that the sun is going down they are carrying them down to the lower stories which are waterproof and which stay warm all night.

"I think I shall go down there now. Come along if you care to."

Of course the children went, and couldn't help noticing that wherever she went, the one group of children who were with her when they first met, kept gathered around her all the time to look after and wait upon her, as if afraid she would come to harm.

Down from one floor to another they followed her, until they came to the rooms where the workers were stowing their bundles, and there in neat ranks were rows upon rows of these silk cradles with the ant babies in them, all stowed away, snug and warm as you please.

"Goodness, what a lot of children," exclaimed Betty.

"Yes, I have a lot of them, but I love children, and they're all just as good as they can be," replied Mrs. Ant proudly. "They would be a great deal of trouble though if the older ones weren't so good to look after the babies for me."

On the way up again they came to an enormous room, where the roots of a tree were growing through the roof, and clinging to the roots were many queer-looking creatures much different from the ants, but ants were looking after them and Bobby noticed some of them stroking two horns growing right out of the strange creatures' backs.

"This is where we keep our cows," said Mrs. Ant.

"Cows?" exclaimed the children in surprise.

The Queerest Cows You Ever Saw!

"Yes, these are our cows," said Mrs. Ant. "You might call them

Plant Lice, but they give delicious milk through those two horns you see on their backs. They are milking them now. We like this milk so well and it is so nourishing that we always keep a herd of them. They're no trouble at all, because you see they feed upon those roots and are very contented here where it is always warm and dry and none of their enemies can reach them.

"Bring me some milk," she ordered, and her attendants ran to do her bidding. The children were glad she didn't offer any to them, because they would have hated to refuse, but at the same time they didn't think they would like that kind of milk.

Betty then said they must be going, and thanking Mrs. Ant, they started back, following a guide that she sent to show them the way.

At the entrance Mr. Grumpelkin was waiting for them.

"What do you think of the Ants' home?" he asked.

"They are very busy people," said Betty, "and their home is nice and cozy, but it is too dark; I don't think I'd want to live there."

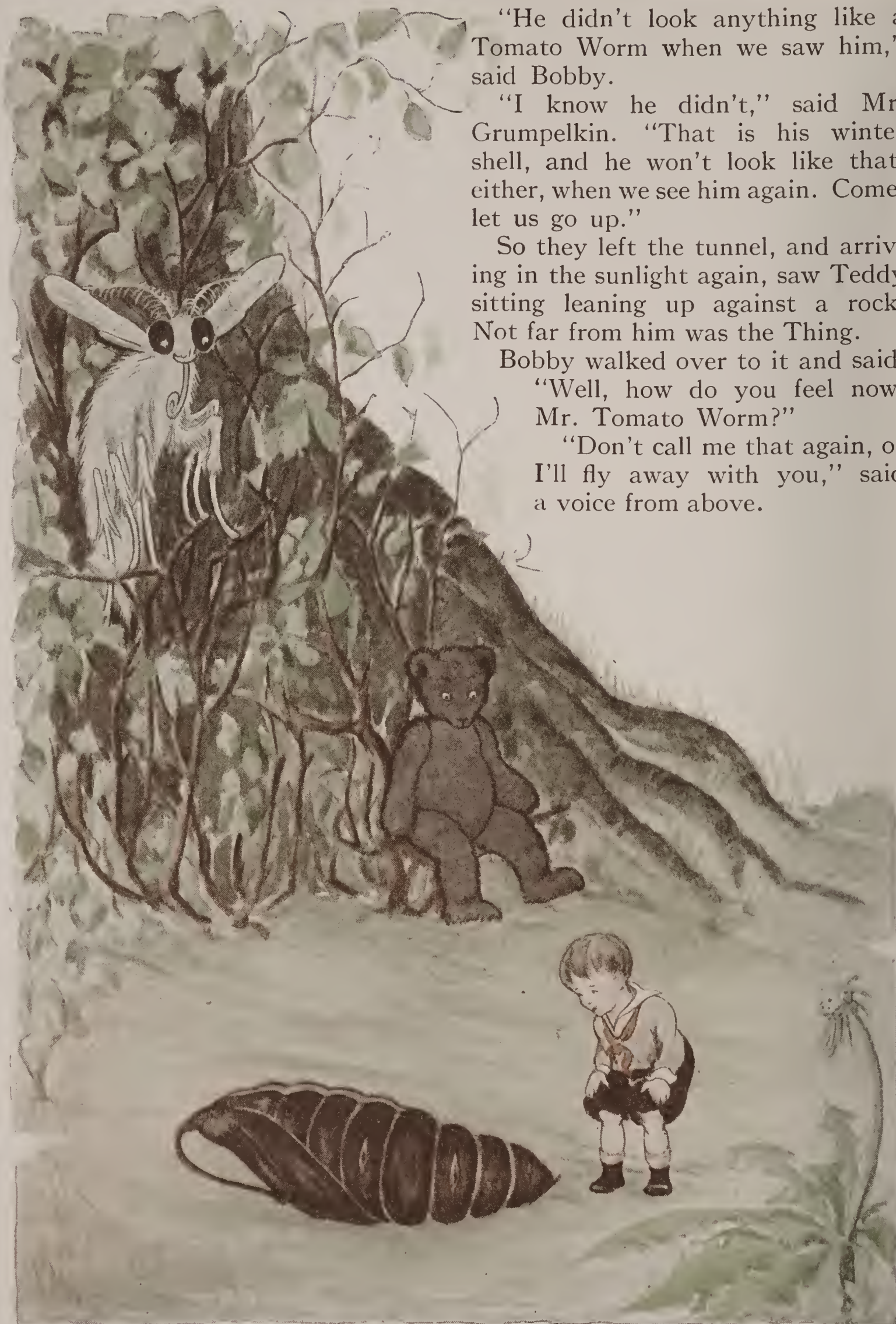
"I don't blame you," said Mr. Grumpelkin, "but it is very nice when a thunder storm comes up. The wind can't blow their house away."

"Let's go up and see where Teddy is," said Bobby.

"Yes. Where is Teddy?" asked Mr. Grumpelkin.

"The last we saw of him," said Betty, "was just before we went down to visit Mrs. Ant. He was dragging a funny-looking thing with a handle on it."

"Oh, that was the cocoon of the Tomato Worm. It is about time for him to be coming out," said Mr. Grumpelkin.



"He didn't look anything like a Tomato Worm when we saw him," said Bobby.

"I know he didn't," said Mr. Grumpelkin. "That is his winter shell, and he won't look like that, either, when we see him again. Come, let us go up."

So they left the tunnel, and arriving in the sunlight again, saw Teddy sitting leaning up against a rock. Not far from him was the Thing.

Bobby walked over to it and said, "Well, how do you feel now, Mr. Tomato Worm?"

"Don't call me that again, or I'll fly away with you," said a voice from above.

"No he isn't either," said the Bug. "I am the Thing on the ground, as you call it, and I don't look much like a Tomato Worm, do I? That is just my shell."

"Me a Tomato Worm!" Says He

Bobby was startled, and looking up saw a monstrous pale, weak-looking bug with two clubs sticking out of his back where his wings should have been.

"I didn't say anything to *you*," said Bobby.

"Indeed, you *did*," said the Bug. "You called me a Tomato Worm."

"I did not," said Bobby hotly. "I called the Thing here on the ground a Tomato Worm, and that is what he is."

"No he isn't, either," said the Bug. "I am the Thing on the ground, as you call it, and I don't look much like a Tomato Worm, do I? That is just my shell."

Bobby was astounded, but upon looking closer he saw that the Thing on the ground was split right down the back and empty now.

"I can forgive you, though," continued the Bug, which Bobby noticed was getting brighter in color and seemed to be getting stronger every minute. "I was once a Tomato Worm, although I don't like to admit it now, and for one whole summer I did nothing but eat tomato leaves all day and all night, and I grew and grew, shedding my skin every time I outgrew it, until I became very sleepy, so I dropped to the ground and burrowed in, changing my shape to that you see on the ground."

"Oh-oo-oo-oo-ho!" said the Bug, stretching himself, and as Bobby watched he could hardly believe his eyes, for as he stretched he trembled and shook, and as he shook, his clubs of wings seemed to spread out into stubby wings, and long, soft fur seemed to be growing over his body.

Just then Betty and Mr. Grumpelkin came up.

"Sh-sh!" said Teddy. "Watch him."

"Well," resumed the Bug, "I made a nest for myself and slept until a short time ago, when I awoke and thought I'd like to get out in the daylight again, so started digging. That digging was hard work, for I had to dig backwards on account of the style of my armor."

"Ho-hum-m!!" he said again, and stretching and shaking himself once more, his wings became twice as big as they were before.

"Now I am feeling much better and stronger; I shall soon be able to fly, I think. There isn't much more to tell," he said. "I came out into the passageway, where your friend there found me, and you know the rest."

"Who is he?" Betty asked Mr. Grumpelkin, as she noticed the rapid change taking place.

And Then Away Flew the Worm!

"He is the Hawk Moth, as you shall soon see," answered Mr. Grumpelkin, and as he was speaking, the moth gave a mighty stretch and yawn, the two caps fell off his wings which, badly wrinkled at first, soon spread into broad, soft wings, covered with the soft down which also covered his body. His color became brighter, and after a few flaps of those new wings he said, "Goodbye, everybody. Thanks for helping me out. I am hungry again. Now for a good meal; but I believe I have a craving for something sweet. See my wings, how beautiful they are? No more tomato leaves, nothing but nectar is good enough for me now," and he was off, disappearing among the trees.

"Isn't it disgusting, how proud some humble folks become when they get some new clothes?" remarked Teddy. "Yet he is really the same old Tomato Worm with a new suit."

"We might as well be going," said Mr. Grumpelkin, and led the way

out of the wood along the side of a dusty road. Suddenly the path they were following was blocked by a big round ball which was slowly rolling toward them.

"What's that?" exclaimed the children in one voice.

"Just wait and see," said Mr. Grumpelkin, with a twinkle in his eye, as he led the way around the moving ball.

As they came to the other side they saw a bluish black bug standing on her hands, using her feet to roll the ball, and pushing away, patiently rolling the ball as if that were all she had to do.

"Well! It's Mrs. Tumble Bug," said Betty.

"Where are you going with that ball?" asked Bobby.

"I am taking it up to the top of the hill. I have a well up there where I am burying them," said she.

"What do you want to bury it for?" asked Bobby.

"This ball is very good food for my children," said she, still patiently pushing at the ball, "so I have rolled up an egg in it."

Mrs. Tumble Takes a Tumble

She didn't get to finish what she was saying, for the earth in the path became loose, her feet started slipping, and before they knew it the ball had rolled right over the top of her, sending her end over end down the hill, while it, gathering speed every inch, rolled so swiftly that it didn't stop until it had rolled well out on the roadway at the end of the path. As it reached the road, they saw another Tumble Bug start after it, and as they watched him, he started rolling it off in the other direction.

"That isn't a bit fair," said Betty. "Mrs. Tumble Bug worked so hard to make that ball and roll it up here,

and now that fellow is going to steal it."

"Just watch and see what happens," said Mr. Grumpelkin smilingly.

Mrs. Tumble Bug was hurrying down the hill as fast as she could go, and soon caught up with the other one. She didn't fight with him, but just went around to the other side as quickly as she could and started pushing. She was the larger, so soon the ball started moving back the other way. The stranger, seeing that he couldn't get it that way, started helping her roll it up the hill again.

"He's a rascal, isn't he?" said Bobby. "He saw he couldn't steal it, and now he is trying to make her believe that he intended to help her all the time, only pretending that he didn't know where she wanted to take it, so was pushing it in the wrong direction."

"She knows what his scheme is," said Mr. Grumpelkin, as they started down the hill toward the ball again.

As they were passing the two Bugs with the ball, Mrs. Tumble Bug whispered to Betty. "He thinks he will get some of this to eat if he helps roll it up, but he is badly mistaken." Then she chuckled to herself and kept rolling.

As they went on, Mr. Grumpelkin explained that Mrs. Tumble Bug puts an egg into each ball and buries them in wells, sometimes as many as six, one above the other, in one well. The heat of the ball keeps the egg warm until it hatches, when the young Tumble Bug eats the ball, and by the time it is eaten he is old enough to go out and roll some balls for himself, which he does, and digging a well, buries himself with his ball of food, there to feast upon it at his leisure.



Billy was trying to scramble out, but as he climbed, the loose sand of the sides kept rolling down, thus carrying him farther and farther toward the bottom at every step. But that wasn't all. Right at the very bottom of the pit was a regular storm of sand.

Billy, the Doodle Bug, and the Sandstorm

Suddenly they heard some sharp yelps from Billy, who had strayed out to the side of the path. Rushing over in the direction of the yelps, they found Billy in a round pit with loose sand all around the edges. He was trying to scramble out, but as he climbed, the loose sand of the sides kept rolling down, thus carrying him farther and farther toward the bottom at every step. But that wasn't all. Right at the very bottom of the pit was a regular storm of sand. They could see an ugly head which seemed to be all pincers, thrashing around at a great rate, throwing sand all over Billy, some getting into his eyes, and some rolling back down and pushing him lower and lower in the pit.

The children were much alarmed for Billy's safety, because by this

time he was almost in the jaws of the monster!

"Oh! Mr. Grumpelkin, make him stop, he will eat Billy if he ever gets hold of him," cried Betty, and Bobby called, "Here Billy! Come Billy!" but Billy couldn't get out. The monster at the bottom of the pit, feeling sure of his prey, had stopped his mad hurling of sand, and was just waiting until Billy could slide the rest of the way down, when Mr. Grumpelkin waved his cane to attract his attention.

"Good evening, Your Majesty," said the monster at the bottom of the pit.

"Good evening, Mr. Doodle Bug; I see you are quite busy," said Mr. Grumpelkin.

"Yes, I am," replied the Doodle Bug. "I was so busy getting this meal that I didn't see you until you

waved. I don't know exactly what it is that I have caught, but I have hopes that it is as good as it looks."

"I am afraid you have made a mistake this time," said Mr. Grumpelkin. "You have caught a friend of mine—besides, he wouldn't be good anyway. Your stomach isn't used to that kind of diet; it might make you ill."

During the time they had been talking, Billy was sliding farther down into the pit until now he was right at the jaws of the Doodle Bug, and whining pitifully.

"Well, now as I get a closer look at him, I don't think I do care much about him, but I have a very good stomach, and don't believe he would hurt me any," said the Doodle Bug, eyeing Billy closely as if undecided as to whether he would take a chance at eating him or not.

Betty and Bobby held their breath.

"Oh, I guess I don't want him," said the Doodle Bug finally, and suddenly lifting Billy on his head, he gave a quick jerk and with a sharp yelp Billy went sailing through the air, landing at a distance outside the pit among the skeletons of the Doodle Bug's past victims. It was not until then that the children realized what terrible danger Billy had been in. They noticed that the skeletons were mostly of ants.

Billy picked himself up, shook himself all over, and came running to Bobby just as fast as he could. Bobby picked him up and said he was going to carry him after that, so he couldn't get into more danger.

"My! that Doodle Bug must be terrible," said Betty, as she looked at the skeletons lying all around them.

"Yes he is," said Mr. Grumpelkin. "The Doodle Bug is really an Ant Lion, and a lion he is, too. He has a very large body shaped like a top

—you only saw his head—and he digs that pit in the loose sandy earth, then buries himself at the bottom. He is very fond of Ants, so digs his pit close to an Ant's house. The Ant is very curious, and seeing the pit, stops to find out about it. Once he steps over the edge, he starts slipping just like Billy did, and the Ant Lion, hearing the sand rolling down, sticks up his head and starts throwing sand just as he did at Billy. Once he gets him in his jaws, he makes short work of him, tossing his skeleton away as he did Billy, and burying himself, awaits another victim."

"How terrible!" said Betty.

She then remembered that they must be getting back home, so, Mr. Grumpelkin leading the way, they started.

A Hairy Monster and His Trap Door

They had covered just a short distance when there was a rustling through the grass, and quick as a wink a monstrous yellow and brown Spider appeared, snatched Teddy, kicking and squirming and yelling for help, and ran away with him as quickly as he had come.

Mr. Grumpelkin started out after them, calling to the children to follow, but the Spider was far ahead. As they came out into an open space they could see the Spider in the distance about to enter a hole which had a lid over it.

"That is the Trap-Door Spider," said Mr. Grumpelkin, excitedly, "and once he gets inside his den, Teddy will be lost."

All of a sudden they heard a loud, buzzing sound, and a dark shadow passed swiftly over them. Looking up, they saw a big Wasp making for the Spider as fast as she could fly. They watched breathlessly, and just as the Spider was about to dive into



"That is the Trap-Door Spider," said Mr Grumpelkin excitedly, "and once he gets inside his den Teddy will be lost" ~ ~ ~ ~

his den, the Wasp made a swoop, thrusting his lance-like sting into his body, and it was over.

The Spider dropped in his tracks, slowly releasing Teddy, and as Mr. Grumpelkin and the children came up, Teddy had kicked himself free and was smoothing his rumpled fur.

"Oh, Teddy!" said Betty, throwing her arms around him and hugging him tight, "I was so scared."

"You came just in the nick of time, Mrs. Wasp," said Mr. Grumpelkin.

"Thank you so much," said Betty. "You saved our Teddy's life. What can we do to repay you?"

"Nothing at all," answered the Wasp. "I wanted that Spider for food for my babies when they hatch."

And, bidding them goodbye, she took the Spider and flew away.

"Served that Spider right; he ought to be killed," said Bobby.

"He is not dead," said Mr. Grumpelkin, as they resumed their journey homeward.

"Not dead?" exclaimed both of the children in surprise.

"No, he is just 'chlo-ro-form-ed' as you would say," replied Mr. Grump-

elkin. "Mrs. Wasp's sting simply makes the Spider helpless, and he remains alive but unable to move for weeks. Mrs. Wasp takes him to a cell that she has prepared for one of her babies, and tucking an egg away with the Spider, she plasters them both up. When the young Wasp hatches, the Spider is good, fresh food for him until he grows strong enough to break out of the cell and hunt for himself."

"Serves him right," said Bobby. "He was going to eat Teddy alive."

As he finished speaking one of the Imps appeared suddenly and said excitedly to Mr. Grumpelkin: "A Mantis is eating a whole family of Grasshoppers; hurry before it is too late to stop him."

"Goodbye, children," he said, "I must be gone," and he vanished into the air.

As they looked at each other they saw they had become their real sizes again, and there stood Teddy motionless, leaning up against Betty.

And so they set out for home, glad that they were so large that they need not fear the tiny but terrible monsters about their feet.

Adventure the Third

Down Into the World Under the Water

SEVERAL days had passed since the children had paid their first visit to the Land of Muchenplentie. This bright, sunny morning, just as Bobby was putting on his stockings, the door opened suddenly, just a little, and in popped one of the Imps. "Oh-ho, I fooled her that time," said he. "It takes more than a cat to catch me. You ought to tie up your cat at night, though. She doesn't seem to have any manners at all. I was just coming through the kitchen as nice as you please, not troubling anybody, you know. She was asleep behind the stove, and just as I got to the door she waked up. Don't know what she thought I was, but she started for me, so I just hurried enough to get here in time to slam the door in her face. Serves her right."

"How do you happen to be here?" said Bobby, recovering from his surprise. "I thought you never left the woods."

"Go just any place H. M. Mr. B. A. Grumpelkin sends me," said he, shortly. "Told me to deliver this note to you this morning before breakfast." And he handed Bobby a very neatly folded piece of paper.

Bobby opened it and read:

An Invitation from the King

"Master Bobby:

"I have just received an invitation from Mr. Water Spider to

pay him a visit, today. He and a few of his friends are trying out their new diving bells, and have invited us to go along. You and the others may meet me at the big rock near the old oak, at two o'clock sharp. I have arranged to have Mr. Turtle ferry us across. Send word by my Imp whether you can go.

"(Signed)

"His Majesty,
Mr. B. A. Grumpelkin."

"Just wait a little until I see sister—she will ask mother," said Bobby, and hurried over to Betty's room.

"Look what we got from Mr. Grumpelkin this morning," said he, rushing to Betty and giving her the note.

"Where did this come from?" asked Betty, after she read it.

"One of the Imps brought it this morning—he's waiting in my room for our answer."

"Oh, no, I'm not; I'm right here, ho! ho! ho!" said the Imp, with his merry laugh, right at Bobby's heels.

"Goodness! you gave me a fright," said Betty. "Where did you come from?"

"H. M. Mr. B. A. Grumpelkin—Bobby's room—Bobby's heels—right here," said the Imp, as if afraid to waste a word.

"Well, just a second, Mr. Imp, until I ask mother; I'm sure she will let us go," said Betty.

She returned shortly with mother's permission, and wrote the answer on the back of the note, folded it and gave it to the Imp.

Taking the note he started jumping up and down, each time higher and higher, like a rubber ball.

"What are you doing that for?" asked Bobby.

"Just-wait-and-see!" said the Imp, and at the word "see" he bounced right up and out through the window into a tree, and from there he vanished into the air.

"How funny!" thought Bobby and Betty together.

All Ready at the Rock

That day at two o'clock found the children waiting at the old rock.

"Ow-oo-yip!" they heard Billy howl, as if being hurt.

"Come right along here, sir; what do you mean by running away, when you knew I was coming for you at two o'clock. Next time you can stay at home," and here came Mr. Grumpelkin, leading Billy by the ear.

"But Billy didn't know anything about it," said Bobby.

"Well, he should have," answered Mr. Grumpelkin gruffly.

"How do you do, Miss Betty," said he to Betty, bowing very politely. "Is everybody ready? I sent the Imps over to call Mr. Turtle. They ought to be there by the time we are." So, blindfolding them all as before, they set out through the woods.

It was not long before they reached the place selected by Mr. Grumpelkin. Upon removing their blindfolds they again seemed to be in a strange part of the wood beside a big pond.

"Now, are you all ready?" asked Mr. Grumpelkin, as before.

"Yes," said Betty.

"Yes," said Bobby, but it sounded like a shout.

"Woof," said Billy, and they thought surely it would split their ears.

Then again everything seemed to grow large, the water seemed to get blacker and deeper, and the lily pads became enormous rafts, but of course it was really the children getting very small, and Teddy stopped getting small before the rest of them, just as he had before.

"What's that coming across the pond?" said Bobby, pointing to a big raft coming toward them.

"Why, that's probably Mr. Turtle coming for us; I sent the Imps to tell him we would be here at this time." And, sure enough, as the raft came closer, there were the Imps sitting on his back and pointing in their direction.

As the raft came alongside, a monstrous head lifted up out of the water and a pair of sharp green eyes peered at them.

The Ride on the Turtle's Back

"I suppose I ought to eat the whole bunch of you for throwing stones at me the other day," said the Turtle, and Bobby became frightened.

"He's all right," said Mr. Grumpelkin to the Turtle. "Just a bit foolish sometimes, but after he has a chance to visit some of our people, he will be more careful how he treats them."

"All right, climb on so we can get started," said Mr. Turtle. "Get up pretty well to the center of my back so the waves won't wash you off."

One of the Imps sat on the top of his back and held the other by the hand while he reached down to help Betty up, and with Teddy to help lift them from the ground, they were soon all sitting safely upon Mr. Turtle's back and swiftly gliding in and out among the lily pads.



As he was talking he came closer and the children saw at once that he didn't look like a Spider at all ~.~.~.

After they had been floating along for some little time, Mr. Grumpelkin pointed toward the roots of a large tree growing out of the center of the pond.

"See that tree?" he asked. "Well, right near there is where the Water Spider family lives; likely they are looking for us now."

As they approached the tree a funny-looking raft came floating toward them. As it came closer they noticed a spider upon it.

"Who's that?" asked Bobby. "Looks like someone on a raft who has lost his paddles."

A Queer Passenger on a Queer Craft

"Just wait a bit," said Mr. Grumpelkin, "and you shall see."

"Good day, Your Majesty," said a voice from the raft.

"Good day, Mrs. Raft Spider," replied Mr. Grumpelkin.

"Who is that you have with you?" asked the Spider.

"Oh, just a few friends of mine on a little visit. We are going over to visit your cousin, Water Spider. Won't you go along?"

"Thank you so much, I'd like to, but you see I am going the other way and can't manage this raft very well. I have often thought I'd get a couple of boatmen to row me from one place to another, but you can't depend upon them."

"What is that on the raft with you?" asked Bobby.

"Why, those are my eggs; they are about ready to hatch, and it's a busy person I'm going to be when they do hatch."

"Look out," cried Bobby. "You are running into a log."

"Oh, that's all right," said she. "It doesn't matter where I go—just as well one place as another. Mercy! that was quite a bump—nearly pitched

me off—I guess from the size of this log I'll stay here for a little while. Well, it ought to make a good hunting ground, nice and cool and shady; there ought to be plenty of gnats. Hope you have a pleasant visit; stop and see me some time."

The Turtle, who had stopped during the conversation, now started again, and as they were approaching the old tree Betty said, "What are all those shadows, skimming over the surface of the pond?"

"Shadows?" said Mr. Grumpelkin, "I don't see any shadows. Oh you mean the Hy-dro-met-ri-dæ."

"The what?" asked Bobby.

"Now there, you are getting in a hurry again," said Mr. Grumpelkin impatiently. "I was just going to say the Hydrometridæ or Water Striders."

"Oh yes," said Bobby—"Water Spiders. I've seen them many times under the bridge. They walk on the water, don't they; but how do they move so rapidly?"

And They Weren't Spiders at All

"You Humans call them Water Spiders, but they really are not Spiders at all, for they have only six legs, while Spiders have eight, and they don't walk on the water, either, as you shall very soon see."

By this time they were nearing the place where the Striders were hunting.

"Well, what luck are you having today, my friends?" called Mr. Grumpelkin to the one who seemed to be the leader of the group.

"Pretty good," answered he. "A couple of the brothers have caught some flies; I have only found three gnats, so far this afternoon. We were just thinking of going over across the way—this doesn't seem to be a very good hunting ground."

As he was talking he came closer, and the children saw at once that he didn't look like a Spider at all, and as he moved slowly they noticed that he didn't walk on the water but, resting his hind legs and the back part of his body on the water, he used his middle set of legs as oars in pushing himself along, just the same as paddles in a canoe.

"Sh-sh-sh," said he suddenly. "There's a fly across the way," and he was off like a flash, catching the fly between his two fore legs and carrying him off with him.

"What a terrible creature," said Betty with a shudder.

"Nothing wrong with that," said Mr. Grumpelkin. "At first it might seem wrong that some of our people eat each other, but you are not much better; you eat the meat of birds, and pigs and other animals."

"Well that's different," said Betty.

"Not at all," answered Mr. Grumpelkin. "While you will find that our people hunt each other as food, you will find only a very few who will eat their own kind and *you* have cannibals you know, so I can't see very much difference. You'll find that while many of our people are very bloodthirsty, there are others who live on leaves and grasses, just like your horses and cows, but if these others didn't hunt the grasseaters, they would get so thick in time that you would have nothing to live on at all."

They had by this time reached the family of Water Spiders who were to take them down into the depths of the pond. They were waiting for them and had everything in readiness.

After they had been introduced, Mr. Grumpelkin asked where the special diving bell was that had been prepared for the party. It was brought up alongside the Turtle's

back and the Spiders with the assistance of the Imps, hauled it up into position for the party to take their places.

What the Diving Bell Looked Like

This diving bell looked just like a great big silken bowl turned upside down. It was very beautifully made, of pure white silk, woven watertight. The spiders had also made a bench all around the sides for everybody to sit on.

Two of the spiders then set busily to work spinning long ropes of silk. It looked as if they were squeezing them out through sieves in the under parts of their bodies, thus making each rope of many small strands.

They spun these ropes from the edge of the diving bell to different parts of Mr. Turtle's back, making it look something like a balloon with its guy ropes. When they had finished the ropes, the Imps held up the edge of the bell while the children crept under and took their places on the seats. Billy was afraid and didn't want to go, but Bobby picked him up and took him right along; and how nice and light it was inside the bowl—the walls seemed almost like gauze.

"You may go on down now and we will follow with some air," said Mr. Spider, and while Mr. Grumpelkin was giving directions to the Turtle as to just how to go down, Betty noticed one of the spiders give a flip with the back part of his body which seemed to form a bubble of air which he caught with his two hind legs and held there.

"Well did you ever," said Betty. "How did he do that?"

"I don't know how they do it," said Mr. Grumpelkin. "They're the only people in the world who can do it and they won't tell anybody else how it's done."

But now Mr. Turtle started sinking, the water began to rush in over his back and the edge of the bell rested on the water.

"Oo-oh," said Betty becoming frightened as the Turtle's back sank away from beneath them. "We're going to drown"; and Bobby began to cry and Billy to whine.

"Now, now," said Mr. Grumpelkin, "there is no need to be frightened; these diving bells are made strong enough to hold against any pressure."

Now they were going down, down, the water became stiller and cooler, and no sound could be heard but their own voices. Looking down they could see Mr. Turtle paddling away below them.

Soon Teddy noticed the water creeping up the sides of the bell. "We will soon need some more air," he said. "The water is getting higher." Just then Mr. Spider appeared under the edge. "Hold tight, I'm going to send some air in." He had hardly finished before he turned around and released the bubble he was holding between his hind legs, right under the bell and with a commotion of the water it plopped in, lowering the water at the bottom. Then another bubble was brought, and another, until the water was forced down almost to the edge of the bell again.

How the Diving Bell Worked

"You see," said Mr. Grumpelkin, "the air can't get out through the top of the bell and since the water is around the edge it can't get out there, so remains inside here, leaving this air space for us."

Just then Mr. Spider appeared at the bottom of the bell, releasing another bubble and came in, taking a seat on one side.

"We are down now, to where our homes are," said he.

The children looked down in the direction in which he was pointing, and there among the stalks of the reeds growing up from the bottom were several white diving bells like the one they were in, only smaller, securely anchored from all sides and swaying gracefully like balloons in the water.

As they came up to them; according to instructions Mr. Turtle stopped that they might get a good view.

"You see," said Mr. Spider, "we have to have air to live, just the same as you do, but we like to live in the water; so we build air-tight houses, down here, safe from all our enemies, where we can come to eat and sleep and raise our families." Pointing to the dome he continued, "We fasten our eggs up there and when they hatch, our little ones remain at home until they are old enough to look out for themselves. After that they go out and build homes of their own."

"Mr. Turtle will have to be going up for air very soon," said Mr. Grumpelkin. "While he can stay under water for a long time, he must breathe the same as we do, so we will have him take us on down to the bottom and you can tie us up to some stalks while he goes for a little rest."

So down, down, they went until they could see the bottom; then Mr. Spider swam out and very deftly clipped one thread at a time, attaching them one by one to sticks and pebbles lying about the bottom. Mr. Turtle then departed, promising to return shortly.

"Well, who's that?" said Bobby pointing at a stone beneath them. "Isn't he funny. Looks like he was all head, doesn't he?"

"Better draw us down closer," said Mr. Grumpelkin to the Spider, "so we can talk to him."



Now they were going down, down, the water became stiller and cooler
Looking down they could see Mr. Turtle paddling away below them

"What are *you* doing here?" came a lazy voice from among the rocks.

"Mr. Caddis Worm, good day," said Mr. Grumpelkin. "These are some friends I have brought down for a little visit."

Lazy Mr. Caddis Worm and His Little Stone House

"Funny looking people, I'd think," drawled he. "No eyes, no pincers and very poor arms, I should say. They won't last long down here."

"Oh yes, we *have* eyes, too, and we're not going to stay very long either," said Bobby.

"Now, take my eyes, for example," drawled the Caddis, as if Bobby

had not spoken. "They are very handy. I can see in all directions at once, without even moving my head, and it is very little that goes on around here that I don't know about. If a nice, fat tadpole or juicy bug comes along, I just reach out and snap! I have a good dinner." As he said this he reached out and grabbed with his arms and viciously gnashed his powerful jaws, so Bobby shrank back as far as he could on his seat, holding Billy very tightly.

"Oo-oo-oh! I'm afraid," said Bobby. "Let's get out of here, he might come up any minute."

"Don't worry," laughed Mr. Grumpelkin. "He can't come up here. Don't you see he is in that shell of stones?"



"Now, take my eyes, for example," drawled the Caddis, as if Bobby had not spoken. "They are very handy. I can see in all directions at once, without even moving my head, and it is very little that goes on around here that I don't know about. If a nice, fat tadpole or juicy bug comes along, I just reach out and snap! I have a good dinner."

"Where?" asked Bobby.

"Well, you see," said Mr. Grumpelkin, "Caddis Worm is a very lazy fellow. He can't grow a shell for his body, which is long and tender, but he can manufacture a sort of glue and spin a web much like the Spider family; so he just rolls along gathering a pebble here and there, wherever he can, and makes them into the long, hollow tunnel you see stretching out back of his head. As you can notice, he isn't very particular about what he gathers for his home—old pieces of wood, snail shells, stones, and anything near at hand—and fastens them together with glue; and there he lives, drawing his head into his shell when somebody stronger than he comes along, but just as cross as he is now when he sees no danger near. He is really quite a coward.

"Sometimes he lives in a sort of cave between the rocks on the bottom, weaving a net out in front for catching his prey, and woe unto the poor fellow who gets caught."

Off in the distance another queer thing had attracted Betty's attention.

The Clever Young Spider and the Snail Shell

"I've been wondering," said she, "how that snail shell happens to be floating there in the water so long. I have been watching it for fully two minutes now; it neither goes up nor down, but remains there, as if held by strings."

"It is held by strings," laughed Mr. Spider. "That is where my youngest son is living until he can have time to build a house for himself. He didn't want to start his house until he was sure he could build a good one, so he searched until he found that old Snail's house. The Snail had died, leaving the home empty, so the boy set to work, and raising it

up on end fastened it with ropes which he spun by himself. He then carried bubbles of air down, one by one, releasing them right under the shell like I did the air in this bell, until the shell was partly full, and would float. He then lengthened the ropes holding it, allowing it to rise to the place where he wanted it, and, after fastening it very securely, he filled it full of air, and now has a very good home, but it's pretty dark. He is building his house not far from there, and it certainly is going to be a fine one."

"A very bright child you have there, Mr. Spider," said Teddy.

"Indeed he is," said Mr. Spider proudly, "but all of our children are bright. They take after their father for that."

Betty thought he was rather boastful, but didn't think it best to say so.

Just then the big green eye and nose of Mr. Turtle appeared under the edge of the bell.

"Are you ready to go now?" he asked.

"Yes, we will have to go back," said Mr. Grumpelkin.

So Mr. Turtle paddled down into position, and Mr. Spider began attaching their guy ropes to his back. Just as he was finishing the last one, a funny-looking animal poked his nose under the edge of the bell. Billy must have thought it was a mouse, because, before anyone knew what had happened, he had jumped into the water and was after it. His jump carried him under the edge, and he was gone.

Betty and Bobby both began to cry. Mr. Spider, seeing what had happened, started for the top, while Mr. Turtle began paddling again, and they left the bottom.

They were rising quite rapidly; as the water pressed less on the bell the air within it expanded, and now and

then a bubble would escape under the edge, splashing water all over them. Teddy held Betty very tightly, and Mr. Grumpelkin held Bobby, while the bell rocked and the water splashed, and it was two very much frightened children who, when the bell once more reached the top of the water, found themselves standing on the good, strong, old back of Mr. Turtle again.

When the Imps raised the bell so they could get out again, their first thought was of Billy. They heard him whining pitifully, and upon looking in the direction of the whines, saw Mr. Spider holding him above the water, while an enormous fly with long legs and a very large head was trying to fly away with him.

"Get over there as quickly as you can," said Mr. Grumpelkin to the Turtle. "There's Caddis Fly, the big, grown-up brother of the Caddis Worm, trying to fly away with Billy. With a sudden start that nearly threw them off his back, the Turtle rushed away. When the Caddis Fly saw them coming, and the Imps and Teddy wildly waving their arms, he made his escape, flying off among the bushes.

Mr. Spider then climbed upon the Turtle's back, giving Billy to Bobby, a very frightened and very wet little puppy.

How Mr. Caddis Changed His Clothes

The children thought they had seen enough for the day, and asked to go home, so the Turtle started back to the shore. On their way they saw a Caddis Worm who had climbed up on a weed and was clinging there; his back was split open and out of it was coming a fly.

"Serves him right," said Betty, "for being so mean. He ought to die."

"No, indeed, he is not dying," said Mr. Grumpelkin. "That is the way

he grows up. After he has lived under the water for a time, he feels a change coming over him, so, leaving his shell, floats to the top and creeps up a weed or stick and clings just as you saw him there. Suddenly his back splits open and out he wriggles. But now he has wings, and creeping higher, his wings dry and he flies away, coming back in time to lay his eggs which hatch into little worms which again go to the bottom to make their shells of pebbles just as we saw down there. Most of the big flies grow up that way, as you shall see later, but the spider family is different; the eggs hatch out into little spiders, who just grow up as Humans do."

Betty's and Bobby's eyes opened wide in wonder as they heard of the marvelous things that were happening in the Land of Muchenplentie.

Mr. Spider said goodbye and left them as they were nearing shore.

As Mr. Turtle paddled steadily along, and as the children looked down into the depths below, they were thankful that they lived safely in a nice, cozy house, with father and mother, and not down under the water.

As they reached the bank Bobby said, "It is a wonderful place down under the water, but I don't want to go again—it's scary."

They thanked Mr. Turtle very kindly, and being blindfolded again were led by Mr. Grumpelkin and the Imps back to the place where they had started.

"I want to take you to visit some others of the Spider family tomorrow, if you will meet me here after supper. That will give us a good, long time to visit before dark. Goodbye."

"Goodbye," said Betty and Bobby.

When they removed their blindfolds there was no one in sight, and they were their real selves again. There was Teddy waiting to be picked

up and carried home, and Billy was starting after a butterfly.

"Come back here," said Bobby. "Haven't you had enough trouble for one day?"

As they started home, Bobby said: "Well that was a good old Turtle, anyway. I'll never throw stones at one again."

That night when Bobby was tucked safely in bed, he dreamed that the diving bell was a submarine run by electricity, that Billy turned into a boy like himself, and they put on

armor like the brave knights used to do. Then with Teddy to run their submarine and water spiders for horses, they took their swords and went down to rescue a beautiful princess from a horrible Caddis Worm.

He dreamed that after a terrible fight they rescued the beautiful princess and he was going to marry her, when he waked up. He went back to sleep again hoping he would dream some more about the Princess, but if he did he never told anybody.



"No danger, no danger at all. Safest way in the world to travel," said a voice right at their heels - ~ ~ ~

Adventure the Fourth

The Trip Through the Air

“COME children, it is time to get up,” said mother. Bobby sat up in bed rubbing his eyes, the door bumped open and in bounded Billy, wagging his tail so hard that he wagged all over, and with yelps of delight he tried to jump up on the bed. After several unsuccessful attempts, he gave it up and sat back on his haunches barking, as if to say he thought Bobby was a very lazy boy for staying in bed so long, when there was so much playing to be done.

“Well, Billy, we had a terrible fight last night, didn’t we?” said Bobby, as he thought of his dream about Mr. Caddis Worm.

Bobby was up and dressed in no time, but sister had beaten him, and by the time he was out to wash his face, she was all ready for her breakfast.

After breakfast sister helped mother with the dishes and dusted, while Bobby carried in the wood, then went out to the garden to pull some weeds.

The day was very warm, so when the sun became too hot, Bobby found a nice cool place under the old locust tree in the yard. The locust was in full bloom, and its sweet blossoms filled the air with fragrance. As Bobby looked up he could see the big Bumble Bees and hear their lazy droning as they gathered nectar from the blossoms. “Wonderful people,” thought

Bobby as he watched them. “I hope we can visit them all some time.”

The birds were not singing much now; they were too busy gathering food for their babies, but from the different trees near and in the distance, he could hear a lazy, sleepy “Oo-wa-a-a-aow, oo-wa-a-a-a-a-aow.” “Wonder what that is,” thought he.

It was now time for dinner, and as Bobby and Billy were both hungry, it didn’t take them long to get to the house when Betty said dinner was ready.

Finally suppertime came around, and I fear they didn’t eat as much as they would have had they not been expecting to make this visit.

Mother said they had been very good children, and worked well that day, so they might go out to play until dark. As soon as supper was over they started, but if Betty had known what was going to happen to Teddy that evening, I think she would have left him at home, but she didn’t know, and neither did Teddy, so they went right along.

Upon reaching the edge of the wood, as they were looking up, Bobby noticed some little airy balloons like spider webs, away up above their heads. “O-o-oh,” said he to Betty. “How would you like to be away up there in one of those balloons? Wouldn’t you be scared, though? Just think

what would happen if they should fall out."

"No danger, no danger at all. Safest way in the world to travel," said a voice right at their heels.

This Time They Rode in Balloons

They turned around suddenly and there was Mr. Grumpelkin in his big tall hat, his whiskers wrapped around his waist and an Imp holding up each coat tail.

"Goodness, you always give us such a scare," said Betty. "I thought you were to meet us farther in the wood."

"I know I was, but I saw you coming, so thought I'd come to meet you. We must hurry now, for we have a long trip ahead of us this evening, and lots of things I want to show you, so in order to make a quick trip we shall go in balloons, like those you see up there. Now don't worry," he hastened to add, noticing that the children seemed a bit nervous. "You will be just as safe as can be, and, besides, I want you to meet some more of our friends of the Spider family. Be quick and get your blindfolds on."

So while Betty and Bobby blindfolded each other, the Imps blindfolded Billy and Teddy, and they all set out as usual.

This time they stopped near a fence, but upon removing their blindfolds neither Betty nor Bobby could remember of having been there before.

"Now, everybody ready?" asked Mr. Grumpelkin.

"Ready," said Betty.

"Ready," said Bobby, and "Woof, woof," said Billy, but my! how loud it seemed.

Smaller and smaller they grew, and larger and larger grew the trees and the grasses, and first thing Billy knew he was looking right into the great big eyes of a hideous green monster

with a terrible mouth, wings standing straight out at his sides, and legs like a jumping-jack. He was working his jaws in a vicious manner, and Billy thought sure he was chewing tobacco.

"So there you are," began the monster, stopping every few words to chew. "Don't care where you step, do you? You nearly stepped on me when you came up. I've been looking for you, young man. You're the fellow who chased me the other day until I was tired out, and then caught me and tried to make me spit tobacco juice, aren't you? Well, now I'm going to make you spit tobacco juice," and at that he made a jump at Bobby, but Bobby dodged out of the way, and Billy started growling and barking. By this time Mr. Grumpelkin saw what was going on, and ordered the Grasshopper—for this monster was a grasshopper—to go away and not bother them again; so he hopped away, muttering to himself some very threatening things he was going to do to Bobby if he ever caught him again.

"He's not a bad fellow at all," said Mr. Grumpelkin, "as long as you treat him right. I can't blame him much though, for not liking you."

"Over here are our friends waiting to take us up. We shall have to go separately, and even then the balloons will have to be more than twice the size they usually make them, because of the additional weight, for our aviators will have to go along to manage the balloons for us."

By means of a grass ladder they climbed up to the top of an old stump, where they could see two mother spiders and a number of their young ones who were just ready to go out into the world. As they got to the top they could see the balloons that were to take them up. Each one was



Helen A. Hamilton

"Well, now I am going to make you spit tobacco juice," said ♣
~ the Grasshopper, and with that he made a jump at Bobby

held by a young spider, but how funny he was holding it; he seemed to be standing on his hands and holding it with his feet.

When the Imps who were carrying Billy set him down at the top of the ladder he started running and barking.

"Stop that, Billy," said Bobby, but Billy wouldn't stop; he was having lots of fun, so finally Mr. Grumpelkin said, "Mrs. Spider, I guess you'd better tie him up, or he might cause some trouble." No sooner said than done. Mrs. Spider darted like a flash, and had Billy in her arms, yelping for dear life; and she wouldn't let go, either, but started spinning a web around and around him every which way until he was completely covered and couldn't move. At first Bobby didn't like it, but Mr. Grumpelkin said it wouldn't hurt him a bit, and if he weren't tied up that way he might fall out of the balloon, so Bobby was satisfied.

"Why are all the spiders standing on their hands?" asked Betty.

"If you will notice," answered Mr. Grumpelkin, "they are squeezing the silk ropes that make the balloon out through the sieves in the back parts of their bodies, and stand upon their hands so the ropes, which are lighter than the air, float upward. When they have enough to carry them, they give a jump into the air and sail away. You will see that they have attached their balloons to the stump to keep them from going before we are ready, because of the size they have to make these to carry us.

Tying the Children in the Balloons

"I believe," said Mr. Grumpelkin, turning to Mrs. Spider, "that it would be best to tie the children in the balloons for fear they will fall out."

"I was just thinking that also,"

said Mrs. Spider, so as the Imps lifted Betty into place, Mrs. Spider carefully attached a few ropes over her shoulders to the balloon which was a big ball of pure white silken ropes, and Betty had quite a scared feeling as she looked up and saw, waving above her head, the hundreds of long ropes that seemed impatient to carry her away.

Next Bobby was placed upon a balloon, then Billy and Teddy. After he was sure they were all safe, Mr. Grumpelkin and the Imps climbed into theirs and Mrs. Spider snipped the threads which had been holding them; but Bobby noticed that theirs were different. Instead of the ball of ropes like that on his, they had a network from one to another of the Spider's eight legs.

"Why don't you have the same kind of balloons we do?" he asked.

"These are made by a different family, and they think they are better," said Mr. Grumpelkin; "but they're not quite so safe nor so easy to ride in, though much handier and easier to make."

Just then the Spider who was making Bobby's balloon said, "Be careful now, we are going to see if it will fly," and up he jumped from the stump.

"Look out," called Bobby. "You might not be able to get back on the stump again."

"I hope I don't," said the Spider. "That's what I am making this balloon for—to carry me away from here." But he dropped back, which showed him that his balloon wasn't quite big enough yet, so he set to work spinning more ropes, letting them float above with the others.

By this time all the other young Spiders were testing their balloons the same way.

"Aren't you going along with us?" they asked the mother Spider.



Betty had quite a scared feeling as she looked up and saw, waving above her head, the hundreds of long ropes that seemed impatient to carry her away

Ballooning, a Sport for the Young

"No, no, our homes are right here," they answered. "We are getting too old for that. Only the youngsters care about flying, and they always leave home that way. That is the way we came here, but it is not likely we will ever bother making balloons again."

As they finished speaking, all the young Spiders called, "Goodbye, mother," gave a jump, and away they sailed.

Up, up, and up they went; they saw the tree tops pass, just like they were sinking into the ground. The ropes to the balloons swung and tugged like they would break away, but they were strong and well fastened. When the balloons started, the Spiders on Betty's, Bobby's, Billy's and Teddy's balloons all climbed up on top and took their stations in the ropes above the children, but the others remained hanging head downward as they flew.

"I shouldn't think that is a very safe way to travel," said Bobby to his aviator.

"It's safe enough," said he, "but it's uncomfortable. It takes more trouble and skill to make this kind of a balloon, but I like to travel in comfort." Bobby thought he said this a little boastfully.

My! What a nice trip the children were having. They soon got over their nervousness and decided to look over the edge, so they lay flat down on the tops and looked over.

Could they believe their eyes! Down below they could see the trees and fields. Bobby looked in the direction of home, and there, sure enough, it was, and he thought he saw father in the yard. "What would they think, if they knew we were away up here," he was thinking, when he heard Mr. Grumpelkin say, "We have

gone high enough now, we may as well start down."

"Yes, but how are we going to get down?" asked Bobby.

"You are up to your old tricks, I see," said Mr. Grumpelkin. "Just keep your eyes open."

"Yes, do you suppose we would come up here if we didn't know how to get down again?" asked Bobby's aviator indignantly, and then set to work.

Now how do you suppose they lowered themselves? Simplest thing in the world. You see the silken ropes being so light and fluffy, held them in the air, so what did the aviators do but just start rolling some of the threads up in a little tight hard ball, making the balloon smaller, until they started sinking, down, down, until they were even with the tree tops.

"Hey! Look out there," yelled Teddy to his aviator. "We are going to land in that tree top."

"What's the difference?" asked the Spider. "All I'll have to do is climb down the tree and make my home. Just as handy for me as if I landed on the ground."

"Yes, but how about me?" asked Teddy.

"That isn't worrying me a bit," answered the Spider.

So Teddy, seeing that it was useless to argue further, when he landed, started climbing down the tree.

Teddy Meets Mrs. Katy Did

He was about half way down when he heard a rather grating voice say, "Katy did."

"Did what?" asked Teddy.

"Katy did," answered the voice.

"Well, all right," said Teddy, "I didn't say she didn't, but who is Katy and what did she do?"

"Katy did," came the voice again.



"Hey! look out there," yelled Teddy to his aviator. "We are going to land in that tree top" ~ . ~ . ~ .



With a flying hop, the monster pounced upon her, grabbing her with his arms and upsetting Teddy.

By this time Teddy was getting angry because he thought somebody was fooling him, so he started climbing in the direction of the voice.

"Katy did," again said the voice, this time closer.

"Well, I don't think she did at all, but I'm going to find out," said Teddy, looking around for the person who insisted on blaming Katy.

There was a slight movement among the leaves and Teddy saw her, even though she was almost the exact color of the leaves. As he came closer he looked at her curiously. At first he thought she was a grasshopper, but saw that her head was different and that she had a beautiful, soft green dress.

"Now," said Teddy, "stop fooling and tell me who Katy is and what she did."

"Well, if you must know, I'll tell you," she said mysteriously. "Come closer so no one will hear"; and as Teddy drew nearer she whispered in his ear—"You see really Katy is nobody, and she didn't do anything, but it's a good joke we've been playing on people for ages, until now they really think that Katy *did*, but she didn't. We all say it so often that they can't help but believe it's the truth, and that Katy did, but so long as there is no Katy, and she really didn't, it doesn't make any difference if they do think she did. Ha! Ha! Katy did! Katy did! Katy didn't!" she called out as loud as she could. "Now I have them guessing, but you won't tell anyone?" she said anxiously to Teddy.

Teddy sat there looking at her, bewildered. He couldn't figure it out

at all. He was just about to tell her how foolish he thought she was, and that people had nicknamed her Katydid, when "Whirr-r-r-r-r-up!" sounded right back of her. It was a terrifying sound, and Katy shuddered, afraid to look around.

Teddy looked beyond her and what a horrible monster! It had an enormous fat body and large green wings with which it made the noise they heard. Its neck was as long as a giraffe's, and its head which it held away up in the air, had big bulging eyes and very sharp pincers; but the thing that frightened them most was its arms which grew out of the sides of its neck. They were lined with barbs and folded like steel traps. There it was, creeping closer all the time, its big eyes peering at Katy. Katy started to jump, but too late. With a flying hop, the monster pounced upon her, grabbing her with his arms and upsetting Teddy.

The Adventure of the Praying Mantis

"Help! help! or he will eat me up," cried Katy.

Teddy broke off a good, strong stick and started to beat the monster over the eyes, so, letting Katy go, he grabbed Teddy. Teddy kept on kicking and beating and pulling until he tore himself free, but in doing so he lost his footing and fell out of the tree in a crumpled heap on the ground below.

The children in the meantime had been worrying about what had happened to Teddy, and when they saw him come tumbling out of the tree, Betty began to cry. She said she knew he would be killed. Mr. Grumpelkin told her not to cry, for he would fix Teddy again, just as good as ever. Then he told the Imps to straighten him out and stand him up, which they did. He then waved

his cane over Teddy's head several times, at the same time saying some mysterious words.

Soon Teddy's eyes opened and he looked around frightened.

"Where is he?" he asked.

"Where is who?" asked Mr. Grumpelkin.

Then Teddy told them all that had happened.

When he had finished, Mr. Grumpelkin said, "You had a narrow escape. That monster was a Mantis. The particular one you met was a Praying Mantis. His family is one of the most terrible of the Land of Much-enplentie. They eat alive any of our people who come within their reach, sometimes eating two or three times their own weight in one day."

"Whew!" said Bobby. "They're worse than the Dragons we read about, aren't they?"

"Yes, much worse," replied Mr. Grumpelkin.

"What's that?" exclaimed Bobby suddenly, as he caught sounds as of a quarrel on a nearby hillside.

"Let's go and see," said Teddy; so they set off in the direction of the sound.

"Good afternoon, friends," said a neat-looking little body as they were passing.

The Children, Mrs. Firefly, and the Burrowing Bees

"Why, good afternoon, Mrs. Firefly," answered Mr. Grumpelkin. "You are out rather early this evening, aren't you?"

"Yes, just a little bit. I awakened earlier than usual, so thought I'd take a stroll before I started out for the evening."

"These are some of my friends," said Mr. Grumpelkin. "We had started over across the way where you hear that commotion. Won't you come along?"

"I suppose it is that Bee family having another one of their quarrels," said the Firefly, disgustedly. "They have them almost every day. But I have nothing else to do now, so I may as well go along." And the party, with the new addition, continued on its way.

Upon arriving at the hillside, they saw two big, shiny green bees. One was walking around the outside heavily laden with pollen, and the other was in the burrow which was just the right size for him to walk into.

"What seems to be the trouble?" asked Mr. Grumpelkin, as they came up.

"Oh, trouble enough," said Mrs. Bee—for it was Mrs. Bee who was outside. Here I've been out working hard all day gathering pollen, but on the way home I had a battle with a Velvet Ant. I crippled him so he was sorry he had bothered me, but some of the dust off him stuck to me in spite of all the washing I could do, and now when I come home this foolish husband of mine, depending

more upon his nose than his eyes, is afraid to let me in. I'll give him a little lesson, though."

So saying, she backed toward the door, thrusting her stinger at him.

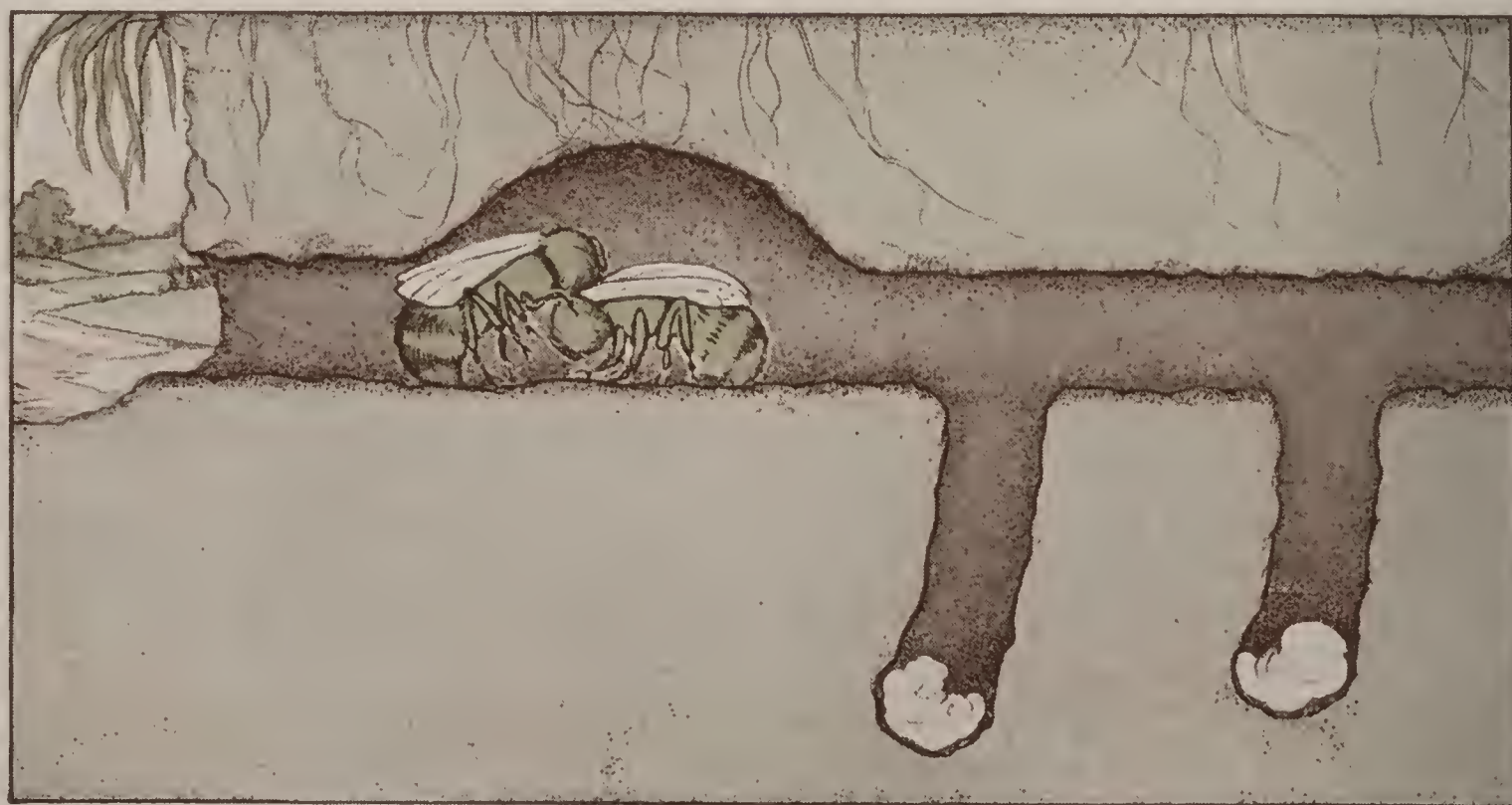
"Look out. Don't sting me," yelled Mr. Bee frightened. "I'll let you in"; and he backed away from the door.

"That will work when nothing else will," chuckled Mrs. Bee. "Won't you come in and see our home?" she asked.

"We'd be pleased to," answered Mr. Grumpelkin. "May I bring in my friends?"

"Certainly," said the Bee, "if you are sure they won't cause any trouble."

"Well, they won't," said Mr. Grumpelkin. Then turning to one of the Imps said: "You stay outside here with Billy and Teddy. We'll soon be back. We are very lucky indeed to have you along, Mrs. Firefly, for I fear my friends wouldn't be able to see in the dark. You follow Mrs. Bee and light the way for us"; and to the surprise of the children Mrs. Firefly



This is how the Burrowing Bees made the entrance to their home and this is how Mrs. Bee had to walk over Mr. Bee's back to get inside.



"What seems to be the trouble?" asked Mr. Grumpelkin as they came up ~ ~ ~

just seemed to turn on the electricity and her whole body lighted up—all but her head and her wings, which she held out at her sides. And following Mrs. Bee, they went in through the door.

After they had gone a few steps they saw Mr. Bee blocking the passage and were wondering how they were going to get farther, when Mrs. Bee just walked right up over his back. They followed her and found that the passage was larger at this place.

"What made you ever cut out an entrance like this?" asked Betty.

A Door for Friends but Not for Enemies

"Why, don't you see why we've done that?" said she in surprise. "It is to keep out our enemies. You see one of us stays there and guards the entrance all the time, while the other is out gathering honey and wax; then if the one protecting the house is attacked, the enemy can only come in from the front, so our chance of being overpowered is small. We have made our tunnel larger at this place, so the one on guard need not go far from the entrance while the other comes in. But if while entering, someone else tries to follow, all we need to do is back up a little farther and we are prepared to fight just as easily as we are at the entrance.

"I'm going to build my house like that when I get big," said Bobby. "Then, if any burglars or robbers come along, I'll make them sorry they ever tried it, you bet."

Mr. Grumpelkin smiled at this but said nothing.

They were now well back in the tunnel, and noticed side tunnels branching off every few steps. "These side tunnels are where we keep our children, until they are able to walk," said Mrs. Bee. "Come on in here, if you want to see our youngest. I have

gathered this food for him and must take it in."

They followed, and there in a nice wax-lined, water-tight, cozy den was the youngest bee. He looked like anything but a bee, though. He was white, and reminded Bobby of a big capsule, such as his mother had him take medicine in. There was just the faintest hint of head and legs.

"Goodness, but he is homely," said Bobby.

"Sh-sh-sh," said Betty. "Mrs. Bee might be angry and throw us out. She thinks her children are pretty, just like any other mother."

"Young man," said Mr. Grumpelkin severely, "it is very ill mannered to say such a thing when Mrs. Bee was kind enough to invite us in."

Bobby was very sorry, but it couldn't be helped, and he made up his mind to be more careful next time.

After looking through the rest of the home of the Bees, which was very much like the tunnel they had just been in, they returned the way they had come, Mr. Bee backing into the enlargement just back of the entrance while they climbed up over his back, and when they were all out again, back he came into the entrance, sticking his head out and looking for all the world like a big cork in a bottle.

"Well, I call that a wise old Bee," said Bobby. "But I thought Bees always lived in hives."

"Oh, no," said Mr. Grumpelkin. "Some of them live in the hollows of trees, some in wood that they tunnel out, and others in the ground, as this family does. This is the only one that lives alone, though, but if we were to look around we should find many other homes of the same kind of Bees near."

"Ooo-wa-a-a-aow! Oo-wa-a-a-aow!" came a grating voice not far away.



Bobby hadn't time to finish his sentence when "Plunk!" a green monster as big as an elephant came right out of the sky

"There's the voice I heard at noon," said Bobby. "Who is that, Mr. Grumpelkin?"

The Children, the Frog, and the Cicada

"Oh, that's the Cicada, usually called the Locust. He is the Methuselah of the Land of Muchenplentie. By the time he can sing that song he is seventeen years old."

"I'd like to see him," said Bobby.

"He was over here to see us," said Teddy, "while you were in visiting. He said they had a village over under that big tree."

"Let's go over—." But Bobby hadn't time to finish his sentence when, "Plunk!" a green monster as big as an elephant came right out of the sky and landed beside them. It hit Teddy and knocked him end over end.

"Hey! What do you mean by that?" yelled Teddy. "Can't you see where you are going?"

"Well, well," said the monster in a croaking voice. "Where did you come from, and who are you? You don't look good to eat."

"I should say I'm not good to eat," said Teddy, "and if you try that again you'll be a sorry Frog."

"Is that so," said the monster. "Well, we shall see"; and he was about to take another jump at Teddy when Mr. Grumpelkin interrupted. "Now, now, what's the use of quarreling. Neither one of you has anything to complain about, so just let things go as they are." And although Teddy didn't say so, he seemed to be rather glad to have it settled so easily.

"Mr. Frog, these are some friends of mine, on a little trip. We are just thinking of going over under that tree to see a colony of Cicadas."

"Are they good to eat?" interrupted the Frog.

"No, no, you wouldn't like them—but, as I was going to say," continued

Mr. Grumpelkin, "why can't you take us over on your back? It won't be much out of your way."

"Well, all right. I was going over to the pond anyway," said the Frog. "According to my calculations there ought to be a bunch of Mosquitoes hatching about now, and how I do like Mosquitoes!"

With the help of the Imps, they started climbing upon Mr. Frog's back.

"O-o-oh! you're cold," said Bobby as he climbed up. "I'll freeze."

"Well, you're hot," said the Frog, "and I'll scorch."

"Neither of you will be hurt," said Mr. Grumpelkin. Then turning to the children, he said: "Mr. Frog is called cold-blooded because he is always just as cold or just as warm as his surroundings, so he feels at home any place."

"Yes, I'd hate to have blood like you Humans, and have to put on clothes to keep warm when the weather gets cool. It must be an awful bother. Now, whenever it gets too cold to suit me, I just hunt up a nice, comfortable place and freeze up for the winter. Then when spring comes again, I thaw out, shed my old skin, and I'm just as good as new again and all ready for another summer."

As they were nicely settled and ready to start, they heard cries of help from their friend the Bee, and upon looking around they saw that a mean looking fly had alighted in front of his door and was trying to get in."

Then Along Came Phora Cara!

"There's that miserable Phora Cara," said Mr. Grumpelkin, "trying to get into their burrow and lay some of her eggs. That's her favorite place to lay eggs, so they can hatch out and live on the young Bees until they grow up!"

"Is she good to eat?" asked the Frog.

"Try it and see," said Mr. Grumpelkin. So Mr. Frog sat there and looked carefully for a moment, as if judging the distance, and like lightning, flop! out stretched his tongue about one-third of his length it seemed, caught the fly, and back it came with the fly glued to the tip. But when he got the fly into his mouth, it wouldn't go down easily. He swallowed twice, but still it wouldn't go. Then settling himself for a mighty gulp, he swallowed again, and this time his eyes just sank right down in his head, clear out of sight. Shortly they came up again. "Pretty big bite," he said; "wasn't very good, either, but when I start out to eat anything, I don't stop, and when I use my eyes I can swallow anything I have a mind to."

"Well, he's out of the way. Are you all ready to start? Hold on tight." And away they went, in long steady leaps through the tall grass. On the way Mr. Grumpelkin explained to the children that Mr. Frog has a very unusual tongue, fastened to the front of his mouth instead of the back, which folds up, so all he has to do when he wants to catch something, is, flop it out, and if his aim is good, as it usually is, the insect is caught on the end of it, which is sticky. But if he finds his victim hard to swallow, he can use his eyes to help, just as they had seen him do."

"What a wonderful creature he is," exclaimed Betty.

"I'm glad Billy hasn't a tongue like that," laughed Bobby, "for if he did he could kiss me whether I want him to or not."

Among the Skyscrapers of Cicadatown

"They were now nearing a city of tall, rough towers, and they could see

them looming up among the grasses in the distance. As they came nearer they found that they were made of dried mud that had been piled up in making a burrow.

"Here is the colony of Cicadas," said Mr. Grumpelkin, as they alighted at the base of the tree. These towers we see around here were made by them in preparing to leave their underground homes, where they have been living for the last sixteen years."

"Sixteen years?" exclaimed Betty. "Why that is more than twice as old as I am, and three times as old as Bobby."

"Yes, and sixteen times as old as Teddy, to say nothing of Billy," added Mr. Grumpelkin. "After they have spent so long a time in the ground they get tired of it and bore their way to the top, where they come out and put on their wings.

"Hello, Bobby," said a weak voice from the trunk of the tree.

They all looked up and there, they saw one of the three mysterious bugs, which they had met in the passage on their visit underground. He was clinging weakly to the bark of the tree.

"Why, hello!" said Bobby, "What are you doing up there?"

"Oh, I was getting pretty old and thought I'd get out and see some of the world. It was hard work, though, I'll tell you, digging my way out and climbing up here. I feel very queer, too. I'm nearly smothering. I'm too large for my skin—just feel as though I'd split."

He had hardly finished speaking before—crack! and he really did split right down the back.

"Now I feel better, he said with a sigh. Well this old skin I've been wearing is no good now; guess I'll climb out," and out came his head. Then with much wriggling and twist-



He was now pure white in color and as he feebly crept higher on the tree, kept shaking his wings. Each time they got longer

ing and turning and pushing he crawled entirely out. The children sat and gazed in wonder as he came, and if he hadn't kept on talking, they couldn't possibly have believed he was the same one. He was now a pure white in color, and as he feebly crept higher on the tree, kept shaking his wings. Each time they got longer.

"See my wings," said he. "Now I can fly, dance and sing and see the world. I got out rather late, so will have to wait until tomorrow for my wings to dry—but then for a lark. They tell me I'll only last for a week, but you can bet I'll have a good time."

Mr. Grumpelkin then reminded the children that they must be going back or it would be too late, so they persuaded the Frog to take them part way. By this time it was getting pretty dark and the Firefly lighted the way for them.

All of a sudden they came to a stop, and all were pitched headlong off the Frog's back.

The Frog Song, and Then—Good Night!

As they were getting upon their feet again, they heard him sing:

Far as we go—you're almost home;

Back to the pond again I must roam.

A million mosquitoes await me there,

Whirling and buzzing in the air—

And a grand big feast they'll be for me,

For I am as hungry as I can be.

As the voice of the croaking old frog was dying away,

The children heard the night imps say:

"Good night, good night; it is no more light,

But you won't get lost if you turn to the right

And then to the left as you round the bend,

Follow this road 'till you come to the end;

And as soon as you're home you must go to bed;

For brother Bobby's a sleepy head."

Bobby was about to say he wasn't sleepy at all, but the song kept getting fainter and fainter until at last it died away.

Billy barked and there stood Teddy leaning up against a tree as if he had never walked.

Betty and Bobby rubbed their eyes and looked around. They were much surprised to find that they were in their own orchard and in the distance they could see the light in their own home.

"Bett-y," called mother, "You must come in now; it's time for bed." And it was two tired children that mother tucked in bed that night.

"Well, I'm glad I'm not a mosquito, with that Frog around," thought Bobby, as he went to sleep.

A Tragic Story

*There lived a sage in days of yore,
And he a handsome pigtail wore;
But wondered much, and sorrowed more,
Because it hung behind him.*

*He mused upon this curious case,
Declared he'd change the pigtail's place,
And have it hanging at his face,
Not dangling there behind him.*

*Says he, "The mystery I've found,—
I'll turn me round." He turned him round;
But still it hung behind him.*

*Then round and round, and out and in,
All day the puzzled sage did spin;
In vain — it mattered not a pin,—
The pigtail hung behind him.*

*And right and left, and round about,
And up, and down, and in, and out
He turned; but still the pigtail stout
Hung steadily behind him.*

*And though his efforts never slack,
And though he twist, and twirl, and tack,
Alas! still faithful to his back,
The pigtail hangs behind him.*

WILLIAM MAKEPEACE THACKERAY

Rhymes for Little Folk



Higglety Pigglety

Higglety Pigglety's come to town
Topsy turvy up side down,
Mad as a hatter, mad as a hare,
Everything's crazy everywhere.

Beds and bureaus, tables and chairs,
All are coming down the stairs,
Over the walk, with a rickety stride,
Off they go on a jigglety ride.

Higglety Pigglety, first of May!
Topsy turvy, moving day!
Mad as a hatter, mad as a hare,
Everything's crazy everywhere.



Gallant Mr. Small

“Oh, won’t you have my seat, Miss Plump?”
 Said the gallant Mr. Small;
 He knows quite well there isn’t room
 For her to sit down at all.

Him and Me

That is him and this is me,
 And we are twins as you can see;
 My name’s Jack and his is Jim,
 And this is me and that is him.

I tell you this because you see
 Folks always mix him up with me.
 Now after this you must agree
 That this ain’t him and that ain’t me.

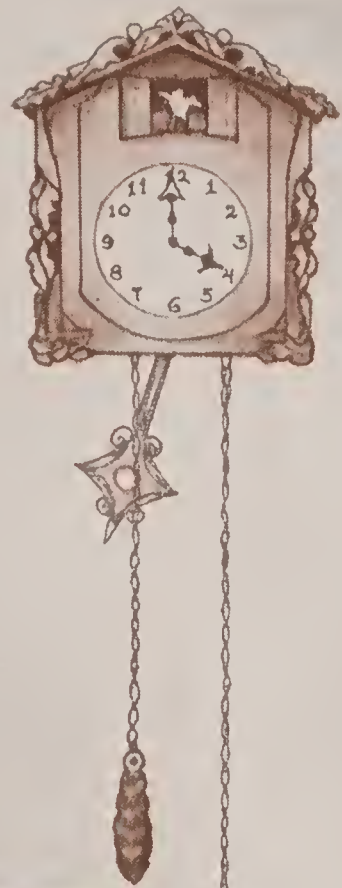
My Kitty and I

My kitty acts so very queer,
She hurts my feelings so,
And what I'm going to do with
her
I really do not know.

Now, when I hug my mother
tight,
She always likes it so,
And that's the way it always is
Just everywhere I go.

My daddy is the very same,
My aunts and uncles, too.
And grandma never gets enough,
That's just as true as true.

But when I start to hug my
cat,
And come up soft be-
hind her,
She runs away so very fast
That I can never find her.



Peter Perkins, the Perverse

Peter Perkins never did
A single thing he should do,
And soon he grew, oh, very tired
Of doing what he could do.

And then he frowned most awfully
And said at last he wouldn't
And after that he always did
Exactly what he couldn't

He walked upon his finger tips
Because he couldn't do it,
And when he had no meat to cook
He promptly then would stew it.

He warmed himself in winter
By a great big piece of ice,
For light he cut from out the moon
A great three-cornered slice.

He slept with both eyes open wide
Because it wasn't done,
And always finished everything
Before it was begun.

A wizard then just came along
And turned him into air,
And said, "A foolish man like that
Should not be anywhere."





The Endless Journey

'Round a circle Johnny
walked
With his small sister
Jenny.
They never came unto the
end
Because there wasn't any.

That Naughty Stove

You are a very naughty
stove
You are not one bit of
good.
My mother said you'd burn
me,
But I never thought you
would.



When I Go Fishing

When I go fishing
I'm always wishing
Some fishes I will get;
But while I'm fishing,
The fish are wishing
I won't, just harder yet.

And all those wishes
Of the fishes
Every one come true;
So all my wishes
To get fishes
Never, never do.



A Sunbeam Wish

If I could be a sunbeam now,
 All shining light, you know,
 I'd go where other sunbeams
 Just never, never go.

I'd go into the prisons dark
 Where folks are always sad,
 And sorry too, I'm very sure,
 They ever were so bad.

And then I'd go deep in the mines,
 Where folks from morn till night
 Just dig for gold and never see
 The sun all shining bright.

And I would find a forest deep,
 The darkest, dimmest one,
 Perhaps I'd find a flower there
 That never saw the sun.

The

Little Boy

and the

Little

Bird

I had a slice of bread and jam,
 And at my feet was hopping
 A little bird, just picking up
 The crumbs that I was dropping.

And I was glad I was a boy,
 As glad as I could be,
 I had a whole big slice of bread,
 He, just the crumbs, you see.

And then the bird looked at the sky,
 All sparkling, white and blue,
 And with a flash of his bright wings
 Straight into it he flew.

And left me there upon the ground,
 With just my bread, and I—
 I would have given all the world
 If I could only fly.

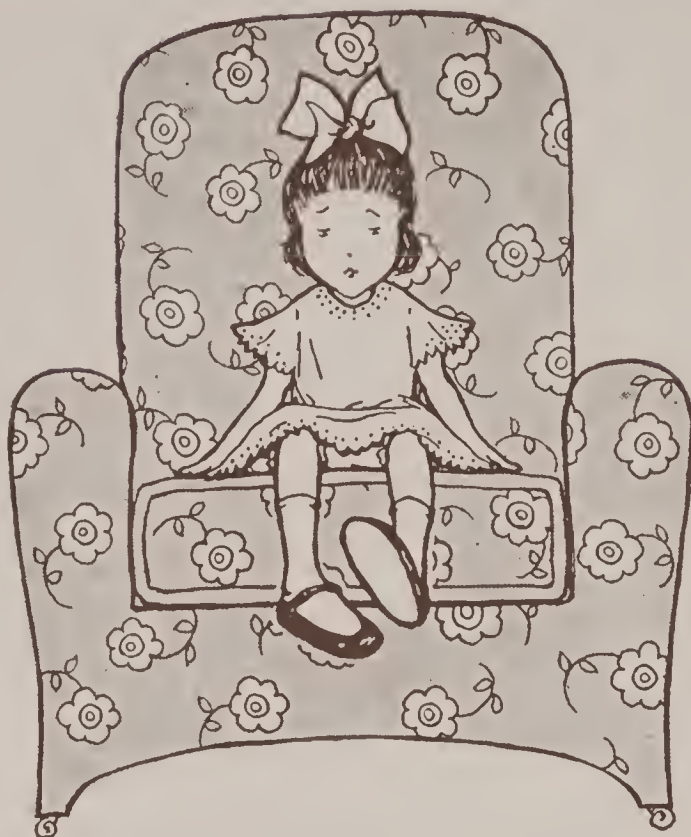




A Falling Star

A star fell from the summer sky,
And where do you think it fell?
Nell looked and looked until, at last,
She found it in the well.

And now she's dropped the bucket
down
And hopes that, in a minute,
When it comes up, the pretty star
Will be a-floating in it.



Constance and Her Pretty Feet

Constance was so very proud
Of her small pretty feet,
She always took them out with her,
When she went down the street.

When she had her picture taken,
She was careful, don't you know,
To stick them out in front of her
So they would surely show.

And, yes, they certainly did show;
They looked like this, that's all.
I guess they felt so very big
Because they were so small.

Question Keys to Rich Treasures in the House of Knowledge

All of the questions here answered were actually asked by the children in the family of a lady, who, as many mothers do, started a "Baby Book" when the first child was born. She, however, kept it up as the family increased and the children passed through the various grades in school. She found each successive child asking similar questions about the same things. Feeling that their little questions might be made the "little keys" to open up the vast storehouse of knowledge, whose departments we, for convenience, label "Botany," "Zoology," "Geology," etc., it became the practice for both father and mother to look up the information for answering the various questions asked and to stimulate the children to look up things for themselves. This work proved a constant and increasing delight to all, and the children made astonishing progress in school. Even the text-books became attractive.

Open the average text-book and it is easy to see why it is not popular with the young. This is how a boy is introduced to geology, for example:

"Geology has to do with the history of the earth and its inhabitants. It is divided into astronomic geology, dealing with the different members of the solar system, dynamic geology, dealing, etc."

This is not the kind of education "mother used to make." Real education does not begin with a definition. It begins with an experience, with curiosity about some individual, concrete thing.

Read the biography of any great man and it is easy to see what the text-books lack. Hugh Miller, as a common workman in a quarry, had his curiosity aroused by finding a strange stone. It was from this incident that he dates the beginning of the interest that made him a great geologist. Edison wanted to know why the wheels went round and so became the wizard of invention.

All children begin so. All children show at first the two most striking characteristics of genius—curiosity and enthusiasm.

"Mother, what makes the pebble round?" That is how Nature starts her geologists. "Who is the man in the moon?"—the beginning of astronomy. "Where do the flowers go in winter?"—botany. School is the place where natural curiosity should not only be satisfied, but stimulated, enlarged, broadened. As a matter of fact it is too often the place where curiosity begins to die.

If, owing to better text-books and more intelligent teachers in the lower grades, it survives these grades, this natural curiosity meets its death blow in the high school unless the child is fortunate in having a teacher who treats the text-book as a tool to study with, rather than a thing to be studied.

A teacher is successful in proportion as he or she fathers or mothers the minds of the children. The mother and father will be successful, in the most important service they can ever do their children, in proportion as they practice in the home the method of the best teachers. This method may be summed up in a sentence: "Satisfy and stimulate the natural curiosity of children about the great new world in which they have come to live."

In the hope that they may bring to others something of the delight and profit they afforded to this mother and her family, these little "Reasons Why" have been made part of "Pictured Knowledge."

Little Eyefuls of Knowledge for Busy Brains

Why Do Cats Have Whiskers?

So that they can move forward with their eyes upon their prey without fear of running into things. The whiskers being long, act as a kind of lever so that the slightest touch at the ends produces a very strong twitch in the sensitive lips in which the whiskers grow.

Why Do We See Stars When We Get a Hard Bump?

Because the jar shakes the optic nerve whose business it is to send the message of light to the brain. The jar makes a series of vibrations and each vibration produces a separate flash.

Why Don't Turtles Have Teeth?

Because the horny, sawlike projections of the nose and mouth answer the purpose of teeth. The turtles easily crop off the water plants on which they live and these, being very tender, need no grinding. It is as easy as it is for you to eat asparagus.

Why Has a Hog a Short Underjaw?

Because in its natural state, it roots for a living and the small underjaw can work more freely in picking up the food which the upper jaw with its nose-plow has turned up.

Why Do a Rabbit's Ears Usually Point Backward, a Dog's Forward

Because the rabbit depends for protection on its speed in getting

away from its enemies and must listen for sounds in the rear. Dogs were originally animals of prey or attacking animals and so were "listening forward" for prey or enemies.

How Do You Talk?

You force the air from your lungs through the tiny cords stretched across a cavity in your throat. This makes them vibrate and so produce sound. You shape and control the sounds to make words by different movements of your lips, teeth and tongue.

Why Are the Shells of Guinea Eggs So Hard?

Because the guinea hen lays her eggs on the ground without a nest.

Why Does An Eagle Lay Fewer Eggs Than a Hen?

Because being a bird of prey, the eagle's food supply is not regular and it cannot afford to have so large a family. Chickens and grain-eating birds can always pick up a living, while the bird or beast of prey must necessarily lead a life of adventure, the "profits" of which are always very uncertain.

Why Do Swallows Fly Low Before a Rain?

Because when wet weather is coming, the insects on which the swallows feed, fly low to escape the moisture of the higher regions.

Why Does a Fly Have So Many Eyes?

Because it cannot move its eyeballs and so must have an eye for

each different direction. This is true of many other insects. Its eyes are made something like the facets of a diamond. An ant has 1,200 of these facets, or little faces, on each eye and the dragon-fly has 17,000.

Why Do Cats and Dogs Lay Back Their Ears When Angry?

So that the ears will not be so easy for an enemy to seize with his teeth. When a cat and a dog have a falling out they both lay back their ears. Horses do the same thing. Horses are not fighting animals in the same sense that dogs and cats are, but they do fight sometimes and used to fight a great deal when they were in the wild state.

Where Do Flowers Go in Winter?

The flowers are part of the pretty summer party dress that the plant puts on in the spring. The plant lives on through the winter but it doesn't need its flowers, so they fall to the ground and decay. Flowers belonging to the class called "annuals," die and are reproduced from the seed.

Why Do Crickets Chirp?

This is their way of talking to one another. Crickets, you know, hide in the dark, and so in order to tell their location to other crickets they must call to them.

What is Cork?

It is the thick, tough pulp of the tree, which you find under the bark. All trees have cork in them, but the cork we use in bottles is from the cork oak, which grows in Southern Europe and Northern Africa. It is principally cultivated in Spain and Portugal.

Do Plants "Understand" Arithmetic?

They seem to, for both the number of leaves and the number of spirals in their arrangement around the stem are the same for any given plant, if it is allowed to have its full growth. In the same way crystals show that they "understand" geometry, because the sides and angles of any given kind of crystal are always in exact mathematical proportion.

Why We Would Freeze if There Were No Air.

If there were no air, besides having nothing to breathe, we would all freeze to death. The earth would become as solid as a block of ice. Why? Because the atmosphere, among others things, acts as a blanket for the earth. It prevents the earth's heat from radiating into space and never coming back again. It also protects us from the chill of the vast spaces through which the earth is rushing as it travels over its orbit. In this respect it acts something like the wind shield of an automobile.

Why Do Kangaroos Have Pouches?

Because baby kangaroos are very small and helpless and cannot follow their mothers as little chickens can. The mother has to carry them in her pouch until they have grown strong enough to hop about with her.

Why is the Butterfly an Unselfish Mother?

Because the food she provides is not such as she can use or enjoy, but such as the newly hatched larva will need.

Why Do Some Animals Put Up Hay?

The Alpine hare of Mongolia gathers hay in the summer, and after drying it—just as the farm-

er does—stores it in her home for the winter, where it serves not only as a bed but as food until spring comes again. In Siberia there is a kind of ground squirrel that also cuts, dries and puts away hay for winter use.

How Does Water "Throw Stones?"

The waves gather pebbles as they retire from the beach and then as they curl forward again, throw them on the shore or against the rocks. By "throwing stones" in this way the sea waves cut deep into cliffs, so that the rocks finally overhang and fall into the water. Then the waves make more pebbles out of the smaller fragments and use them to bring down more rock.

Why Do Fish Have Air Bladders?

By increasing or reducing the amount of air in these bladders the fish can raise or lower themselves in the water and remain at any level.

Why Don't Plants Grow as Well in the City as in the Country?

Because plants and trees require sunlight and fresh air. The leaves are the lungs and stomach of the plant. They breathe in the air through porous openings on the under side. These become clogged by the impurities of city air.

Why Can a Newly Hatched Bird Live for Hours Without Food?

Because it is fed by the yolk of the egg which it has absorbed into its body. All the birds do not hatch out at one time and if the "early birds" got hungry too soon the mother would have to leave the nest to bring them food. Then the other eggs would get cold and the babies never come out of them at all.

Why Are Moths Downy?

Because they fly at night when the air is so much cooler than in the day time and this down is a kind of fur that helps to keep them warm. Compare with the wings of the butterfly which spends its life in the sunshine.

Why Can Animals Move Their Ears While Man Cannot?

Man's ears are so shaped that he can hear sound from any direction, while the ears of animals can hear best only when turned in the direction from which the sound comes.

What Bird Flies Backward?

The humming bird can fly backward a little ways. Watch it when it is hovering over a flower.

Why Do Woodpeckers Peck?

Because they can tell by the sound where the hollow places are and whether there is "anybody at home;" that is to say, if there is an insect inside. You know how to tell whether a watermelon is ripe, don't you? The woodpecker uses the same idea in his business.

What is a Dewdrop?

It is some of the water vapor in the air condensed by the cooling off of the earth after the sun has set.

Why Are Lips Red?

The lips, mouth, eyes and all the inner passages of the body are lined with a covering called "mucous membrane" which is very thin, has a larger supply of blood vessels than the skin, and the red blood shows through.

What Are Eyebrows For?

Eyebrows are the hedge fences above the eyes to keep out intruders.

The worst of these intruders is the perspiration which gathers on the forehead and would run down into the eyes but for these bristling hedges which catch it. Now you know why you have no eyebrows under the eyes. Tears must have a chance to run away and not be caught by bristling brows.

Why Do Birds Prefer Silk and Wool Linings for Nests?

Because silk and wool are non-conductors of heat, and while the birds do not know what a "non-conductor" is, they do know that silk and wool will keep the nest warmer for the babies than pieces of cotton. Put out some strips of silk, wool and cotton where the birds can get at them and you will see.

Why Are Ducks and Geese Like Sailors?

Ducks and geese waddle for the same reason that a sailor does, but the sailor does it on purpose and the geese and ducks can't help it. Their bodies are so wide that their legs are necessarily placed wide apart in order to act free of the sides when they are swimming. A sailor gets his rolling gait because he must keep his legs wide apart when walking the deck of a rolling ship.

How Do Crickets Chirp?

By rubbing together the file-like edges of their wing covers; this makes these membranes vibrate and so produces sound, very much as you make music on a comb by putting a piece of thin paper over it and then singing through it. It is the male crickets that do the chirping.

How Can a Snail Move Without Feet?

It "walks" by means of the little fringe of muscular skin that is at-

tached to its body. By first stretching and then shortening this skin, it creeps along like an angle worm. You notice this is quite different from the motion of the little green worm that "measures you for a new suit of clothes." The measuring worm humps up his back like a letter A every time he takes a "step."

How Does a Frog Croak?

A frog croaks just as little boys and girls talk, by passing air over vocal cords in the larynx of the throat. Many people think the noise is made by blowing up his sacs and letting the air out again, just as boys make a noise with mouth balloons. The sacs do help, but in another way. They are filled with air through openings in the mouth, and when the frog sings, they vibrate like the membrane of a drum and so increase the noise.

In the Middle Ages the moats, or ditches around castles, used to be so full of frogs that their concerts disturbed the lords and ladies of the castle in their slumbers, so one of the "chores" of the boys in those days was to chase the frogs out of the water, morning and evening.

Where Are the Stars in Daytime?

Just where they are at night but we cannot see them because the sun's light is so much brighter and stronger. An electric bulb lighted on a sunny morning does not noticeably increase the light in a room.

Why Can't We Feel the Earth Go Round?

Because it moves at a steady, even rate. If it jolted or speeded up we should notice the difference and feel the motion of the earth.

Where Does the Water Boil Away To?

The heat changes it to water vapor and it floats out through the spout of the teakettle.

Why Can't You Hardboil An Egg On the Top of a Mountain?

Because the pressure of the air is less and so the boiling point, or temperature at which the water changes to vapor is lower. Increased pressure is needed to heat water above the boiling point, so an egg can not be cooked in the ordinary way on a mountain top because the water in which it is boiled can not be made hot enough to cook it.

How Can Flies Walk on the Ceiling?

Because their feet are sticky and are built like suckers or leeches, and because their bodies are lightly made.

Why Does a Ball Bounce?

Because it is flattened a little when it strikes the wall or floor but springs back again to its round shape. This springing back forces the ball upward and so makes it bounce.

Why Do Partridges Roost on the Ground?

Because their legs lack the muscles that would enable them to hang on perches like other birds.

Why Do Partridges Build Their Nests Far Away from Fences?

So that their enemies cannot slip up on them through hedges and brush. The ancestors of the partridge formed this habit of nesting in the fields, and they still keep it up even where the fences are only barbed wire.

Why Do Geese Fly in a "V?"

Because they are such large birds that the wind offers much resistance to their bodies, and by flying in this way they "split the wind," as a ship splits the water. The leader drops back into one of the lines occasionally, because, being at the point of the "V," he bears the brunt of the wind. He drops back to rest while one of the geese immediately behind him takes his place as leader for a while.

Why Do Chickens Dust Themselves?

To rid themselves of insects. The insects are choked by the dust. Horses do the same thing for the same reason.

Why Don't Sleeping Birds Fall Off the Perch?

Because they have muscles that pass over the thigh and knee joints in such a way that the weight of the bird's body pressing on the cords, closes the toes around the perch. It is a kind of automatic clamping device.

Why Does Ice Float?

Because it is the only thing in nature that is expanded by cold. Expansion makes it lighter.

What Would Happen if Ice Did Not Float?

Everything in the world would die because the first ice formed, instead of floating, would sink to the bottom of the body of water on which it formed. Since it is a poor conductor of heat, it serves as a protector so that at the depth of a few feet the temperature of the water during winter is never under 40° and so does not freeze. If ice sank as fast as it formed, all bodies of water would be changed to solid ice.

REASONS WHY

The water in the soil would freeze to a depth of many feet and would not thaw out in summer more than a few inches below the surface. Trees and shrubs could not then stand the winter and would die. Then, the animals would all die, too.

Why Are Some Pebbles Round and Others Flat?

The round pebbles were made on the shores of lakes and seas, where they were constantly rolled by the beating of the waves. The flat pebbles were originally broken in chips from larger rocks and were then pushed along by streams, which constantly wore them thinner and thinner.

How Does Frost Help Things Grow?

By getting into the crevices of rocks and breaking them up so that they may be acted upon more easily by water and other agencies that, in the course of time, cause rock to decay and make soil.

How Far Do Pebbles Travel on a Beach?

In his First Book in Geology, Dr. Schaler of Harvard says: "A pebble, in times of calm, travels a little distance every time the waves strike; as this is say, six times a minute, the stones move an average distance of ten feet per minute in all weathers. They would thus travel between twelve and fifteen miles a day."

Why Does a Fish Always Float with its Head Up Stream?

Because the stream would otherwise carry it away. By facing the current and gently moving its fins, it can remain in one position as long as it likes, just as a hawk can keep in one place in the air.

Why Are Birds' Wings Larger Than Fishes' Fins?

Because air is so much lighter than water that it requires greater power to hold up and move the body of the bird than the body of the fish.

Why Have Fish No Eyelids?

They do not need eyelids, as we do, to keep our eyes moist and to keep out dust, because they live in the water.

What Are Corn Husks For?

To protect the young and tender grain from the sun and keep it moist while growing. For the same reason wheat grains have husks, which, after the wheat is threshed, we call chaff.

Why Do Flowers Smell Sweeter After Rain?

Because the rain washes the impurities out of the air and the odor of the flowers is not mixed with so many other smells by the time it reaches your nose.

Why Do Ducks and Geese Wet Their Backs Before a Shower?

The wetting of the outer feathers mats them together and with the help of the oil, which these birds put on their feathers, a kind of rain coat is formed which prevents the rain from reaching the skin through the dry and loose feathers underlying this outer coat.

Why Do Ducks and Geese Sleep in the Water?

Because they cannot roost on trees, and by staying in the water they cannot be attacked by hidden foes on the bank.

How the Sun Turns Leaves Green and Hands Brown

Why are growing plants green? You have seen onions or potatoes that sprouted white in the dark cellar, or grass that grew yellow under a board, haven't you? Why weren't these things green? Because they got no sunlight. It is the sunshine acting on the substances which the plant takes up from the soil and rain that produces a bright green substance called chlorophyll. Plants get sick when they don't have enough sunshine, so, you see, the green color of leaves is a message sent by the plant to the world, "I am strong and healthy." With the help of the chlorophyll the plant can use the sunlight to change water and carbon dioxide to leaf and flower material. It gives the plant energy or power to absorb the things which are its food. Without the sunshine no chlorophyll can be formed so the leaves are not green and the plant can't "digest" its food so well.

Instead of becoming green in the sunlight healthy people sunburn, that is, their skins take on a reddish tan color. What makes the difference? "Tan" is a layer of coloring matter or pigment formed by the sunlight in animal cells. The same sunlight acting on the different kinds of cells produces the different colors—green in plants and tan in us. When the hot sunshine strikes your skin a layer of tiny brown "paint" grains is deposited there by the blood. It acts as a shield to the tissue underneath, protecting it from the sun's hot glare. This layer of coloring matter is under the outer layer of cells, between the dermis and epidermis, while the chlorophyll is formed in the outermost leaf cells. Sunny sides of leaves are greener than the underside.

Why Fish Have Scales

Did you ever wonder why fish have scales instead of fur, hair or feathers? You know that the hard, flat scales of a fish lie close together and all point backward. Why are these more useful to him in his watery home than any other sort of covering would be?

Fur and feathers, like cloth and sponges, soak up and hold water. This makes them gain weight. The scales of a fish shed water instead of taking it up and they make a smooth, flat, slippery surface which helps the fish move through the water lightly and quickly. If the fish had fur, he could not dart through the water so rapidly and gracefully as he does.

Why a Cut Heals

The blood is a very wonderful liquid. Did you know you have a living liquid glue in your body? Besides containing red and white corpuscles which have their own duties to perform, the blood has in it a substance which thickens and hardens in the air like glue. When you cut your finger the blood flows freely for awhile, then stops. The cut does not stay open long, but fills up and soon heals over. This is due to the gluey substance in the blood called "fibrin." You say the blood "clots" and you mean that the fibrin thickens and hardens into a jelly-like mass when exposed to the air. This "clot" fills the cut and "corks up" the open ends of the blood vessels. If it were not for this clotting all the blood in our bodies might be drained out through a tiny cut—we should bleed to death. The surface of the cut gets hard and scabby, but underneath the flowing blood is gradually absorbing the clot. The

blood vessels and nerves are healing and growing together. Finally, underneath the dried and hardened fibrin or scab, even the skin grows again and you wake up some morning with the scab gone and no sore finger any more.

Why We Wink

Why do you wink regularly, without thinking about it or being able to help it? Because the eye is such a delicate and sensitive piece of machinery that it has to be cleaned up and given a rest very often. On each side of the nose, near the eyes, is a tiny gland which makes the salty liquid we call tears. If you feel very badly about something, this little gland overflows and spills tears into your eyes and down your cheeks, but ordinarily it just lets enough moisture out to keep the lid and eyeball well-oiled as they rub over each other. The quick closing of the lids cleans the eyeball and gives it an instant's rest in its busy work of seeing the big world all around you.

What Are Corns For?

Corns are to keep tight shoes from hurting your feet.

To be sure they don't succeed, because they can't. They do the best *they* can, but your feet still hurt, because you will go on wearing tight shoes. "That's where the shoe pinches," as the saying goes.

You know when boys start going barefooted in the spring, the one who can walk over rough places first—including cinders, is very proud of himself. The reason he can do this is because he has formed callous places on the bottom of his feet by constant running about. The callous places are formed by Nature in order to

protect the feet. Whenever there is pressure or danger of injury to the nerves the outer skin thickens and forms a pad to protect the tissue underneath.

Where shoes do not fit, especially if they are too small, or if there are rough places in either shoes or stockings, these places press on the nerves and hurt them, and Nature begins putting on this pad of skin to protect the sore spot. At first the pad relieves the pain a little, but after a while the spot hurts worse than ever, because of the extra pressure on the nerves.

Why We Blow on Things to Cool Them

A hot stove radiates heat, or sends it out evenly in all directions. That is the nature of heat, to spread out on all sides. When we blow on a hot cup of tea, we blow away some of these waves. We chase them farther from the tea. More soon come to take their places because a hot object is always trying to bring itself to the same temperature as the surrounding air. That is why it sends out the heat waves. If we help to carry the heat waves away from the hot tea, we are helping it to get down to the temperature of the air. A cold object put in a hot room absorbs some of the heat of the atmosphere, and warms up. There are no cold "waves." Cold is only the absence of heat.

What Becomes of the Burnt Part of the Candle?

The longer a candle is lit, the shorter it grows. You say it is "burnt up." But is it really gone? No, nothing in Nature is ever destroyed or wasted. Things change their form and perhaps we can no longer see them, but they are never

lost. The heat of the flame melts the wax or tallow. When a certain temperature or "hotness" is reached, this wax doesn't exist as wax any more. It takes some of the oxygen out of the air and changes to a kind of gas called carbonic acid gas or carbon dioxide. Part of it changes to water vapor, too. If you could gather all the carbonic acid gas and water vapor together and weigh them, you would find that they weighed exactly the same as the length of candle which you said was "burnt up."

When a candle has been burning for some time you have to cut down the wick or "trim it." Unless you do this, the blackened and charred left-over wick will make the candle sputter and burn low. This left-over wick is the part of the candle which did not "burn up." That is, it is the part which did not change to a gas. There is always a solid part or ash formed in the burning-up process.

Why Chickens Have Gizzards

Chickens chew with their stomachs. If you ever looked into a chicken's mouth you saw that there were no teeth there. How *does* the rooster "chew" the corn and table scraps that he gobbles down so greedily when you feed them to him? Along with his meal he picks up pebbles and all sorts of small, hard objects. These are churned around and around with the food in the rooster's stomach or gizzard. The pebbles and glass cut up the food and grind it to pieces, just as well as you could chew it with the very whitest and sharpest of little teeth. From his gizzard the chicken's food passes to the intestines, is absorbed and taken up by the blood and goes all over his body, to strengthen and nourish him, but

the pebbles stay behind, ready to grind up his next meal. When these grinding things wear small and smooth, they pass out of the body, and new, sharp-edged ones are swallowed to take their place.

This gizzard of the rooster is not a big, pear-shaped bag, as your stomach is. It is a door-knob shaped mass of muscle lined with a tough skin, quite unlike the soft, smooth lining of your stomach. This hard lining does not secrete the gastric juice either, as the corresponding lining in your stomach does. That work is done for the rooster by a side stomach, which pours the gastric juice upon the food while it is still in the crop. Next time you have chicken examine the gizzard.

Why the Cow Chews Her Cud

All animals belonging to the great Ruminantia family, including the cow, deer, sheep, goat and camel, chew their food more than once. They are not provided with as many teeth as the horse and dog, or as you and I. The camel is the only member of the family which has upper front teeth. To make up for this seeming neglect Mother Nature has given them three or four stomachs. If you ever watched a cow cropping grass you saw that she swallowed the mouthfuls without chewing them long. After grazing a while she found a nice, quiet spot under a tree and lay down to rest. Then, if you watched her closely, you saw a movement in her throat that looked like a lump of something coming up into her mouth. Pretty soon Mrs. Cow was chewing and blinking very contentedly, and perhaps you wondered if it could be possible that cows chewed gum.

What really happened was this:

The grass, which was swallowed without much chewing, went into her first stomach or paunch. From here it was passed on to the second stomach. This second stomach rolled it into cuds, and when she was ready for it, sent one of them into bossy's mouth. If milking time interfered with the very important work of chewing her cud, Mrs. Cow sent the cud back to her second stomach to wait for a more convenient time to be finished. After she had chewed and chewed, oh, ever so long, she finally swallowed the cud for the last time and it went, this time, to her third stomach. Here the business of digestion was carried on much as it is in our own bodies, and bossy's food was finally absorbed by the blood and carried to all parts of her body. Hasn't the cow a queer way of getting what she eats ready for her body to use?

Why Do Bees Have Stings?

When mosquitoes, flies and fleas bite they are obtaining food—they suck your blood through the puncture they have made in your skin. But ants and spiders and bees only bite or sting when they are angry and think you are interfering with their rights. The bee's food, honey, is so very delicious that many animals and insects like to steal it. Now the bee has to work very hard to gather this precious honey, and so you see, if she wants to keep it all for the bee-hive people and their babies, she must be able to make other living things afraid of her. That is why her sting is so very painful to you. It is fatal to insects.

Why a Sting Hurts

Do you know what makes the bee's (or wasp's) sting hurt so

much? Let's look through the microscope at this little weapon. You can see a two-pointed little lance, shaped like an open pair of shears. Each prong is provided with little points or scales pointing backward from the tip. It is really a hollow tube. A little sac of poison opens into the tube and pours its irritating liquid, formic acid, into the wound made by the stinger. The tiny points catch in your flesh and make it very hard for you to pull the "stinger" out.

A Patriot That Dies for Her Country

And what do you suppose happens to the bee after she has stung you? The little points catching in your flesh make it impossible for the bee to pull the stinger out after she has driven it in. So she breaks away from it and goes off without it. But the stinger is a very important part of the bee's body. She cannot live without it. So if you could forget the pain of the sting long enough to watch the bee afterward, you would see her crawl away somewhere and die in the course of an hour or two. It is not her own welfare that the little worker bee dies to defend. She gives her life in defense of the store of honey which means life to the whole hive.

What Makes Wrinkles?

Wrinkles are folds in the skin. If your skin were just big enough to cover your body when it was straight in every part, how would you ever kneel down to say your prayers, or bend your elbows to carry food to your mouth? Look at your fingers. See the folds of skin over the knuckles. Face wrinkles are made by repeating the same motions so many times that creases will not come out.

The skin of young people is so soft and pliable that the creases do not stay, but when one gets older they remain and tell tales. If you want a happy face when you are older, you must smile often now and if you do not like a cross face, you must not frown and look disagreeable while you are young.

Wrinkles also come to a face when it grows thinner from old age, or any other cause. The extra skin folds with creases, just as an apple skin shrivels when the apple shrinks or dries up. Mother Earth's wrinkles — the mountains — are caused in the same way, you remember, wrinkling as the earth shrinks.

Why Man is Not Furry

Ages ago when, according to the theory of evolution, the first men rose from the animal world—strange, new creatures who could think and reason—they were covered with a thick coat of hair. But because they could reason, when they were cold they built fires to get warm and wrapped themselves in the skins of the beasts they had killed. After a while they learned to build little huts to protect themselves from the weather. It is funny, isn't it, to think that your great, great grandfather, thousands of years ago, didn't need clothes, because he had a shaggy coat which couldn't be taken off?

But when Mother Nature saw that these children of hers (all living things are Mother Nature's children, you know) could keep warm without her help, she gradually withdrew her aid. Little by little we lost the coats of our ancestors, except on the tops of our heads and over our eyes, and a little remnant of hair which still remains on the body. Hold your

arm to the light and you can see it. Mother Nature is wise, she never wastes her gifts, so now we must keep ourselves warm with clothes.

Why Are All Our Fingers Not the Same Length?

Because Nature made the hand to be a "perfect instrument," which it would not have been if the fingers had been all the same length.

Lay a pencil across the palm of your hand and close the fingers down to it. Do you see how every finger-end touches the pencil? It is because of this evenness when the hand is closed that you can grasp so well. If the fingers were even when open this would not be true.

When our ancestors lived in the woods and ran from tree to tree, their very lives depended upon their power to grasp, hence the fingers adapted themselves to this need. Later, when delicacy of touch and power to pick up small things became important, the hand still further changed its form; the fingers became more pointed at the tips.

No other organ that is not vital, in the whole animal kingdom is so remarkable as the human hand.

Why Does Not a Third Set of Teeth Grow?

Sometimes it does. But so seldom that we look upon it as a "freak." You think the little, new baby has no teeth, but she has twenty of them, hidden in the gums, ready to come poking through when they grow long enough and are needed.

A baby who sucks her food has no use for teeth. Under each little tooth and even farther down than where these first teeth grow, there are tooth-germs which will become the second set of teeth—the perma-

nent teeth. But below these tooth-germs there are no others (except by some accident) to make a third set of teeth. The first set of teeth lasts about six years and then the roots are absorbed by the second set, growing underneath them, and the first set almost drops out.

Great care should be taken of even the first set of teeth. They should be kept clean and be filled if they decay, because they either help or injure the teeth growing beneath them. Even greater care must be taken of the second teeth as they are the last ones and ought to be good for a lifetime.

What Makes Us Stretch?

Stretching is a twin sister to yawning. The two do not look alike, but they serve a similar purpose, and both are enemies of laziness.

You yawn to get more air and you stretch for the same reason. When you stretch you extend the muscles and so squeeze the blood vessels. That makes it harder for the heart to pump the blood through the vessels so it works harder and faster. You stop stretching, but this blood goes coursing rapidly to the lungs and takes up more air, so you breathe more deeply to supply the demand. You also lift the chest when you stretch and that gives the lungs more room which you fill by taking that long, deep breath.

Did you ever watch a new baby stretch, and yawn, and grimace? It is a funny sight. He does not do it purposely. Nature makes him do it to put his breathing in good order and to strengthen his muscles. After you have been reading for some time, get up and take a good stretch and see how relieved you feel.

Why Do We Get Hungry?

"Because we want something to eat, of course," you say. Well, why do you want something to eat? Now, please do not say because you are hungry, for that does not answer the question.

The body is made up of cells—tiny little bodies that are really individuals themselves. These cells take the food from the blood as it circulates over the body. Cells of the brain, the muscles, the bones, all need food for this work. When they take it they give back the worn-out cells and the waste. You can easily see that with millions of cells taking food from the blood all the time, it is soon used up, and when the supply is not enough, they send a telegram to the brain: "We need food." It is that telegram that makes you want food and you feel "hungry."

If you exercise vigorously, you feel more hungry than when you sit around the house all day, for the exercise wears out more cells and more food is used up.

You need food for another reason. Part of what you eat is used for fuel to keep the body warm. Burn a piece of dry bread in a shovel. You can feel the heat and see the waste. The fuel food in the muscles burns when it meets the oxygen. This kind of burning gives off the same amount of heat and the same amount of waste as the shovel-burning.

When you run, and jump, and exercise, you breathe faster to get more oxygen, the heart beats faster to send the food stream more rapidly, the cells eat more, the oxygen burns more, and you have to eat more to supply these needs. But it makes you feel a warm glow and gives a bright light to your eyes, and color to your cheeks.

Joseph Interpreting Pharaoh's Dream



The people of ancient times were very much interested in dreams, just as scientific men are today, but their interest in them was somewhat different. They thought of dreams as prophecies that came into their minds in some mysterious way. Monarchs kept wise men about them who undertook to interpret these dreams. This picture shows Joseph interpreting the dream of Pharaoh after the wise men of Egypt had all failed to make anything out of it. Read the story in Genesis, Chapter 41.

What Are Dreams?

Where is the strange dream-world you travel to every night when you go to sleep, and how is it connected with the real world of every day? You know that sometimes the people and events of the dream-world are very ordinary, just like the things that happen to you when you are awake. Sometimes they are strange and terrible, and frighten you; and sometimes this other world is so lovely and wonderful that you are sorry to wake up in the "sure-enough" life of daylight again.

The wisest men of all ages have spent much time explaining what they believe to be the causes of these dreams of ours. And even today, with all our wonderful instruments for finding out the things we do not know, the men whose opinions are worth most are not sure that they know all about dreams. The ancients believed, and savages still believe, that dreams are sent to us by the gods, by dead ancestors and friends, or even by good and evil spirits. They thought that dreams are meant to warn us of danger, or to make us understand something in the life around us which is not clear.

Two Dreams in One Head

You have heard about the boy who worked all day long on a particularly hard arithmetic problem and who went to bed that night with the problem still unsolved. You know how this boy woke up in the morning with the answer in his head as clear as can be, all ready to be written down on paper and taken to school. He dreamed the right way

to work the problem! Such things really do happen. The reason for such dreams, and for most others, is that your mind is made up of two parts which sometimes work together, sometimes separately. It is something like mama's double-boiler. When she cooks oat-meal she uses both parts, but if she wants to make cake-frosting in a hurry, she uses only the upper part of the boiler. One part of our minds we use every day, all the time, and scientists can tell us a good deal about how it works. But the other part, the "subconscious mind," has a different manner of working, and we can not find out so much about it because we do not know when we are using the subconscious mind and when we are using only the other mind. Wouldn't it be funny if mama couldn't tell whether she were using the whole double boiler or just the upper kettle? It was this subconscious mind which went to work on the little boy's arithmetic while he was asleep. It worked the answer all out and told it to him in the morning. Wasn't that wonderful?

Why We Dream Such Queer Things

Perhaps you have wondered why such impossible things happen to you in your dreams. Bears change to people, you are whisked from place to place on the wings of the wind, and people whom you know very well, look and act so strangely! Probably this same subconscious mind of yours is responsible for that, too. The subconscious mind gets ideas from the other mind—shall we say

at second hand? And so, when it gives them back to you again in a dream, it gets them twisted, they don't look as they did when you saw them in the first place, but as they appeared to the subconscious mind.

When we go to sleep the "every day" part of our mind goes to sleep too, or rather stops thinking as steadily and sensibly as in the daytime. But the subconscious mind is as wide awake as ever and because the body and the other mind are asleep, it sometimes plays some queer pranks.

Suppose you went to a circus in June, and away along in January, when you had almost forgotten it, you dreamed all about that circus. Here is the way it happened. When you sat up on the bench and watched the clown, and animals, and all the wonderful things and people, your everyday mind was very much pleased and interested. You liked the circus so much that your subconscious mind was impressed, too, and made a note of everything you saw. Then, one night in January, when your everyday mind didn't remember that circus at all, your subconscious mind thought about it and told you about it in a dream.

A Great Poet's "Pictured Knowledge"

Coleridge dreamed that little piece of poem he wrote called "Kubla Kahn." While reading in his arm chair he came across a reference to Kubla Kahn and shortly fell asleep and dreamed he had written a poem about him. The scenes described came into his dream-mind, in pictures, one after another, and he dreamed he wrote down descriptions of these scenes. When he awoke he wrote the lines you find in his works, but he was interrupted

while writing and when he got back to his pen he couldn't remember another word.

But about the pictures Coleridge saw. Most of our dream thinking, as well as the thinking we do when we are awake, is done in pictures—we are running through the picture book in our brains. That is why we dream so fast. In five minutes between the time father calls John to get up and help do the chores, John dreams a story that it takes him a half hour to tell at the breakfast table.

How and Why We Dream Backward

Here is another experience that shows how fast we dream because we dream with pictures; and also another curious thing, namely, that we often dream backward. Something happens to the outside of us; then we dream a great, long dream to account for it, and the happening itself, instead of being the first chapter of the dream, as you would naturally suppose, is the last. A lawyer dreamed that, in the interest of a client who was being cheated out of her property, he set out to get evidence against the villain of the plot. He pursued him to New York, then to London, then was in a train wreck with him on his way to the Pacific Coast, and finally, in a struggle with him in the Colorado Canyon, they both fell into the river at the bottom of the chasm in the picture "Where the Lonely Rivers Flow." That woke him and he found his wife standing over him laughing. She had just sprinkled some water on his face.

A doctor who had cold feet took a hot water bag to bed, fell asleep, and dreamed he was walking up Mount Etna. Another doctor who

put a mustard plaster on his head to cure a cold dreamed he was scalped by Indians—and there were the Indians and everything.

Why Do We Get Tired?

We get tired because we are poisoned.

Whenever the cells of our body wear out faster than they can be carried away, we feel tired. This comes from a toxin poison or self intoxication.

Hard work, hard play, hard study, worry or anger all use up cells very fast and make us tired because we cannot get rid of the worn out cells so long as we keep on working, playing and so on.

We get a little rested by sitting quietly and waiting for the blood to carry off some of the waste but the best rest is sleep. The poisons make us sleepy and while we sleep the "Sewer Commission" of the body "gets busy" and carries off the waste. When we wake up the work is done and we are fresh and rested for more work and play.

Children sometimes have adenoids which obstruct the nose and throat passages. When a child with these growths awakens he does not feel rested, for not enough oxygen could get in and not enough waste could get out to rid his body of the poison.

What Makes Us Sneeze?

We sneeze because we are tickled. Something in the nose which ought not to be there tickles us. The tickling is a notice to the brain to drive out the intruder which would hinder the air from coming in freely. The brain orders a sneeze, which is a sudden quick outbreathing, to clear the nose. It quite often happens that

the tickling is caused by an itching or an irritation which can't be sneezed away, but this brain relay station cannot reason, it can only act in response to the tickling. Pepper and snuff irritate the nose membrane and cause sneezing.

Some people sneeze when they look at the sun, a peculiarity of which no entirely satisfactory explanation has been offered. One theory is that looking at the sun irritates the eye and this by sympathy irritates the nose. Don't you know how red your nose gets if you cry real hard? It's like that.

One cannot start a sneeze, but he can stop one if he presses a nerve on the side of the nose. It is a good deal like pressing an electric button to signal the brain, "No more sneezing, please."

What Makes Us Yawn?

You open your mouth and shut your eyes, and air comes in to make you wise. One yawns only when sleepy or tired, when not well, or when in an illy ventilated room. In every case it is lack of oxygen that causes the yawn. When one is sleepy or tired (or lazy), he does not breathe deeply enough to fill the lungs and soon the blood is not getting enough oxygen for the tissues. These tissue cells call for air, and the nerve relay station that looks after the breathing sends a hurry call for more air, and you answer by yawning, which is nothing more or less than a sudden, deep indrawing of the breath. If, in an illy-ventilated room the first yawn does not fully relieve the air-famished cells, you keep on yawning, unless you are wise enough to open the window or door to let in oxygen. After one has given "breathless attention" to

some interesting thing, he sometimes yawns repeatedly to catch up in his breathing.

There is one funny thing about yawning. It is catching. To see other people yawn or even to think much about it suggests a yawn to the relay center and you find yourself yawning sympathetically. Instead of lazily continuing to yawn, go to bed and go to sleep, take deep, full breaths of fresh air, or take exercise, to increase the oxygen in the body.

A yawning mouth means a dull state of mind.

Why Is Rainwater Soft?

The water that comes down from the clouds as rain was carried up into the sky as vapor on currents of light, warm air. It came from lakes and rivers of "hard" water and from the salty ocean. Why isn't *it* hard? Before answering that, let's see if we can answer another question. What is "hard" water? It is water which, in flowing over and through the ground, has dissolved some of the minerals found everywhere in the soil. When water changes to vapor and rises, it leaves these heavy mineral substances behind. Rainwater is *pure* water, you see, with nothing dissolved in it. The ocean is salty for the same reason that rain water is soft—because rivers are constantly pouring their water, laden with mineral matter, into it and the "rain fairies" are continually carrying pure water up into the sky with them, leaving the salty minerals behind.

Why Things Float

You say a piece of wood floats because it is "light" and that iron sinks because it is "heavy." It is because

of the arrangement of tiny particles called molecules. In substances like wood which float on water, these molecules are not packed so closely together as the molecules of water. Substances which sink in water have their molecules packed more closely than the water molecules.

Why is it that ice, a form of water, floats? Because in the freezing process the water expands. If you freeze a cubic inch of water, the ice obtained will take up more than a cubic inch of space. The molecules are not packed in so tightly in the ice as in the water. Sometimes the milk freezes in the bottle on winter mornings. What happens? Either the cover is pushed up and off, or the bottle breaks. The water in the milk took up more room when it was frozen than as a liquid, so it forced its way out of the confining bottle. There are no more molecules of milk after it is frozen, no more milk is formed, but they occupy more space—they are not packed in so closely.

What Is Soot?

All fuel is made up of carbon, hydrogen, and oxygen along with a great many other substances. When the fuel is burned the substances change their form. Some of the hydrogen and oxygen unite to form water vapor. Some of the carbon unites with the oxygen to form carbonic acid gas, a very disagreeable and bad-smelling mixture which is poison to animals, but food for plants. Some of the carbon, mixed with the mineral substances found in all wood and coal, is left behind as ashes. But after all these changes have taken place there is sometimes still some carbon left which has nothing to unite with—it is left without a partner, shall we

say? This carbon is soot. Carbon is naturally very black and smudgy. You can see Mr. Carbon as he really is in the soot in the stovepipe. When there is a great deal of soot, we say the coal or wood was not "good." Why? A perfect fuel would use up every bit of the material in it to form new combinations, that is, it would produce heat with every particle of which it is composed.

What Makes Us Thirsty?

The little cells are funny individuals. They have to drink their food and have it thin. On this account, a good deal of water must be mixed with the food. Besides that, all the tissues must be kept moist or they would shrivel, all cavity linings must be moist to make them smooth, and all moving parts must be wet and slippery or it would hurt you every time they moved.

Exercise makes you perspire more, the perspiration cools the surface of your body, but you become thirsty because the tissues are needing water to supply that which passed off. Don't be stingy. Give them all they need.

Why Can't We See the Air?

You can see the air if you look through enough of it at a time, as at distant woods or mountains, or up at the sky. To see the air more easily would spoil every eye picture and every camera picture. It would change the color of trees and flowers. It would be as bad as looking through a frosted window pane or a colored glass. We see through the clear window pane because it is transparent. The air lets the light through it for the same reason.

On the wide prairies in hot weather one sometimes sees the air

rising from the ground just as one sees it over a hot stove or a gas jet. But it is in motion then. One never sees air that is not in motion unless its form is changed. It can be made so cold and pressed so hard that it becomes liquid like water or still colder until it looks like ice. Fortunately for you and me it takes a very great degree of cold and pressure to make these changes.

Can Animals Talk to Each Other?

Of course they can. One little dog that I know can even say in our language, "Have it, have it" only he says it in German, "Haben-haben." Nothing but sweet chocolate is tempting enough to make him say it.

Mr. Garner lived in a cage in the woods of Africa and learned the language of monkeys so that he could understand their "conversation" and could talk to them.

Many dogs understand human language, and they show plainly when listening to other dogs that they feel different emotions from different things their dog friends say.

A mother hen can tell her brood that a hawk is near, and tell them so plainly that every little chick hides under its mother's wings for safety.

What Gives Things Their Color?

You know that the colors in the rainbow are formed by a ray of bright, white sunlight being broken up and sent out in different directions by drops of rain upon which it shines. Perhaps you have seen the same thing brought about by a triangular bar of glass called a "prism." We know that light is made by vibrations, or tiny and very rapid movements of the ether strik-

ing against the retinas of our eyes. (Ether is the form of matter that lies between the atoms of all other matter and is not attracted to the earth by the force of gravity.) White light is made by a combination of the vibrations corresponding to all the colors of the rainbow.

Let's pretend that we have a team of six horses, harnessed so that they stand abreast. These horses' names are "Red," "Orange," "Yellow," "Green," "Blue," "Violet," "Indigo," and each one has a pace or rate of vibration all his own. But when they are all traveling together they go at the same speed, and the result is the rate of vibration which produces the color we call white. Suppose these horses traveling along together get the signal "Red." They all stop except the one named "Red," and he keeps on going but changes to his own vibration rate. He brings that signal or message, "Red," to your eyes.

Do you see what happens? When a ray of light falls on a piece of white paper, the paper turns the ray back in your direction, unchanged. When the light falls on a red ribbon, the ribbon takes up all the vibrations or colors of which white light is made, except the red, which it reflects to your eyes. When you see a pair of black shoes, *all* the vibrations are absorbed and none sent back to your eye. A blue dress says "Stop" to all the vibrations except those which give the feeling "Blue" to your eyes, and so it is through all the list of colors.

What Is "Color Blindness"?

When the retina of a man's eyes are imperfect, so that he does not respond to the vibration numbers corresponding to certain colors, we

say that he is "color blind." But we are all color blind to a whole series of colors. Wise men tell us that there are many more than the seven rainbow colors, but that we cannot see them because our eyes are not constructed to receive them—the vibrations of the ether which produce them make no impression upon the retinas of our eyes. Red has the lowest vibration number and violet the highest, of any of those which we can receive. But there are ether vibrations producing color that are lower than those giving us red, and others higher than violet. Scientists call these invisible colors "infra-red" and "ultra-violet." Wouldn't it be wonderful if an inventor should some day make a pair of spectacles which would enable us to see strange new colors?

What Causes Seasickness?

Whoever discovers exactly what causes seasickness and how it may be prevented, will find a fortune awaiting him, or better still, the universal gratitude of mankind.

It cannot be a disease brought on by suggestion, because those who make up their minds not to be seasick are often very sick, while those who expect it may escape. Sickly people are quite often immune, while healthy ones are often the victims of this malady.

It is the universal opinion that closing the eyes and lying in a horizontal position may prevent seasickness, or at least lessen its severity. That makes it look as though the irregular vision caused by the waves has something to do with it, for some people are made seasick by looking at the waves from the shore, others become seasick on the boat before it moves, and people who are

astigmatic (that is, have irregular vision) are often seasick until they have glasses to correct the difficulty.

The horizontal position of the body prevents the violent changes in the position of the stomach. When the stomach is rapidly thrown from one position to another, it upsets the equilibrium centers which have not been trained to work so rapidly and are therefore taken by surprise.

Why the Brain is in the Head

I shouldn't be surprised if a great many of you have wondered why we speak of "learning a thing by heart," when you know we do most of our learning with our heads, and not with the heart at all. Then, you know, you speak about "taking things to heart," "things touching your heart," and we read that some man failed to undertake a thing, or failed in it after undertaking it, because "he had no heart for it."

Now, all these expressions are due to the fact that people a long time ago, including those very brilliant people, the Greeks, believed that they thought with their hearts. You can imagine how they got this idea when you remember how much faster your heart beats when you get excited about something.

But, now that you know that the brains with which we do most of our thinking are in the head, can you give a good reason why your brain should be in your head instead of, say, where your stomach is? One reason you can see is that the head, with its look-out, the eyes, and its telephone system, the ears, can "watch out" for the whole body much better than if it were where the stomach is. You know, a very tall man is apt to bump his head against

the top of an old door, even with his head where it is; and if he has on a tall silk hat, for example, it will constantly be getting knocked out of shape if he isn't careful.

Another reason for having the brains all in one place and outside of the trunk of the body, so to speak, is that there are local brains that run the business of the heart, the stomach, and other departments of the body, while the head looks after the body as a whole. If it had also the work of the special brains to do, it would have its attention divided between several kinds of business, so that it couldn't attend to all of them properly. If it were located in some part of the trunk, moreover, it would probably be influenced too much by "local things," and would not consult the interests of the body as a whole as well as it does now.

In the lower forms of animal life—in the angle worm, for instance—there is no particular place for the brains. The angle worm has brains, such as they are, all over the body. When the higher forms of life were created, and real brains began to develop, there had to be a separate compartment for them, as all the other spaces were taken.

What Is Goose-Flesh?

"Goose-flesh," or "goose-skin" is a condition of the skin caused by the contraction of thousands of tiny muscles in the skin.

Look at the top of your wrist and fore-arm—see the fine hairs growing there. Notice that these hairs lie close to the skin and all slant the same way. Under each hair in the skin is a tiny muscle which is fastened by one end to the hair follicle and by the other to the skin.

When a sudden gust of cold air,

or a splash or spray of cold water strikes the skin, all these muscles contract. This lifts the hair so that it stands up straight, and a tiny little mound or pimple about the base of each hair is pushed up as the hair rises.

This rising of the hair, in the case of the lower animals—as the horse, the cow, the cat and the dog,—is their way of putting on an overcoat because the hair makes a much warmer, thicker coat when lying close and compact.

In some animals, as the cat, the dog, and the monkey, the neck and back will rise when the animal experiences fear or anger. So, a boy may be so scared that his "hair stands on end," or some screechy noise or gruesome sight may give one "goose-flesh."

What Makes a Dimple?

"Baby's dimples are the marks of the angels' kisses," we used to be told, and no doubt they are. These dents in the surface—called dimples—are places where the skin grows fast to the connective tissue beneath instead of lying loosely upon it as it does elsewhere. It is easy to see how the idea of the angels originated, for the effect is certainly pleasing.

Why Do We Need Two Eyes?

Well, would you like to be a cyclops and have but one eye in the middle of your forehead? Even if you did want to be one-eyed, I fear you could not, for you need two eyes. Nature knew that one eye would not do the work.

Shut one eye and try quickly to put your finger on a given point and see how often you miss it. With but one eye you would miss the mark.

You would also be unable to see things at the side of you as you do now, and you would miss something else which comes to you because you have two eyes. What is that?

One eye gives a flat picture like an ordinary photograph, while two eyes acting together give a picture with depth; you seem to see around the object. Look at a stereopticon view without the stereoscope and you get a one-eyed view—then look at it with the stereoscope and you get the two-eyed view.

Why Is Granny's Hair Gray?

I like to think that Granny's hair is gray just to make a halo around the sweet face, but there really is another reason.

The color in the hair, like the color in the skin, comes from a pigment which is only furnished when the hair follicles are in a vigorous condition. The more pigment there is, the darker the hair. When one is strong and healthy, and the scalp is well nourished, the pigment is bountiful, but as age creeps on there is less and less of the pigment deposited. First, there are a few uncolored hairs, then more, until the hair may become quite white.

A sudden fright or sorrow may turn the hair gray in a night, because the nerve shock interferes with the pigment deposit in the follicles.

Nerves control so many things that we have to make them our servants or they will master us.

Why Does Chloroform Put Us to Sleep?

Chloroform was thought to be a narcotic because when it slowed down the heart it kept the brain from getting enough food, while it was said that ether, although it stimulated the heart, produced sleep

from a toxin or poison. Since it has been learned that both of these anesthetics have the same narcotic effect, but that ether is far less dangerous because it does not slow the heart, ether is taking the place of chloroform.

Both ether and chloroform are quickly absorbed by the blood and carried all over the body where they dissolve certain fatty substances which affect the brain. When these fatty substances are dissolved, the brain no longer feels this action and it stops work. When the brain stops work we go to sleep.

Why Are We Giddy When Looking Down From a Great Height?

Fear and faulty vision are the culprits. Fear confuses the brain. We are not willing to trust our steps to the automatic nerve centers. Fear without height produces the same effect sometimes. When the vision is disturbed, the power of balance is also disturbed. For a similar reason when we try to walk down a long hall in the dark we continually bump into the wall. One's sense of balance depends upon correct vision. People whose eyes do not focus properly are quite often giddy even when not looking from a great height.

Why is Yawning Infectious?

Have you ever heard of the Law of Suggestion? We all act upon the suggestion of those about us. Tell your little sister she is a cross little girl and she will frown. If you suggest happiness and love, she will smile. A crowd of people will smile in response to a hearty laugh, or a whole family will look gloomy and feel miserable when one member scowls and grumbles. The more

primitive the act, the more easily it is caught by suggestion. A yawn is an attempt to get more air. Air is our first and greatest need, therefore a yawn is particularly catching. When one child asks for a drink, every other child becomes thirsty by suggestion. Laughter, fear, sleep, breathing and drinking are very primitive needs and are, therefore, easily affected by suggestion. It makes me yawn even to write about it, the suggestion is so strong.

Why Are Some People Bald?

Different people are bald from different causes.

One cause is lack of ventilation in the hair. You may not have known that even the roots of the hair need oxygen. Hats through which the air cannot readily pass or those which press upon the head hard enough to interfere with the circulation of the blood may cause baldness.

Then there is a troublesome germ which causes baldness, and this kind is catching. Extreme cleanliness is the only prevention of this kind.

When the hair follicles are not nourished because of illness or weakness, the hair sometimes falls out. Even children may become temporarily bald from this cause.

Old people are often bald from lack of nourishment in the follicles. This kind of baldness is not catching.

Use only your own hair brush, but use that vigorously. Keep the scalp well washed; go bareheaded as much as possible, and you will not be bald while you are young.

What Are Freckles?

Freckles are variations in the coloring matter.

Everybody, black or white, has some coloring matter in the outer skin or cuticle, unless he be an Albino, who has white skin, white hair and usually pink eyes. The coloring is only one skin deep and is due to a deposit of pigment.

Exposure to the sun increases the amount of pigment, so that people who have lived for centuries in the hot climate of Africa have accumulated enough pigment to make them black. The coloring matter which spreads evenly over the surface and disappears during the winter is called "tan," while that which comes in spots and is more or less prominent is called "freckles."

To remove these pests, one must also remove the outer skin. The only balm the "freckle-face" has is that underneath those spots her skin is fairer than her neighbor's.

Why Do We Perspire?

Mother Nature is very thrifty. She makes one thing serve more than one purpose—sometimes several purposes. For example, just think of the number of things you do with your tongue. You talk with it, you taste with it, it carries your food back and forth in your little Mill Number One from one set of grinders to the other, at the same time mixing the food with nature's mouth "chemical" to help it digest.

Just so with perspiring—there is more than one reason why. One reason we perspire is to help us keep cool; another to help get rid of the wastes in the body. Water containing waste matter is taken from the blood by the tiny sweat glands which lie under the surface of the skin. When do we perspire most, when we are very hot because the air is hot around us, or

when we get warm from exercise? When we perspire from the surrounding heat, the perspiration helps to cool us—and it helps a lot! When we perspire from exercise, it cools us and at the same time helps to get rid of the extra amount of waste we are making because of the exercise. Just think; if you didn't perspire you would have a fever every time you went out to play!

The word perspiration is from two Latin words put together, one of which means to "blow" or "breath" and the other means "through." It is one of those picture words by which they mean to tell that these little water drops come through like the breath out of the mouth. Writers, a hundred years or so ago, spoke of pine trees "perspiring" turpentine.

Why Do We Have Finger Nails?

When Father said "Don't bite your nails," or mother said "Cut your nails," or sister said "What dirty nails!", you really wished you had no finger nails at all. But that was a lazy child's wish and showed that you do not appreciate their service.

These horny plates protect the nerve ends and save you many a pain, but that is only one of the things they do.

All higher animals have some kind of horny end to the toes in form and kind to suit their need. The cat family, who protect themselves by scratching, have sharp claws which they hide above the toe cushions, while the dog family have heavy claws, which they can't hide. Horses, cows, sheep and pigs have hoofs instead of claws. As you need not scratch your enemy to protect yourself, and as you wear shoes of

leather, your nails have taken a different form.

Look at your finger nails. Aren't they pretty with their pink color and white "half-moons"? Your need is dainty touch, the power to pick up tiny things and make quick motions, so your nails are shaped for this need. You could not play the piano so well with no finger nails, but they must be seen, not heard, on the piano. Finger nails are your willing servants. Treat them well. Show that you appreciate their beauty by keeping them clean and well trimmed. Never spoil this beauty or their usefulness by biting them or picking them.

Do We "Catch" Things?

The doctors would be very grateful to me if I could answer that question perfectly—for they only know in part.

This much is certain, something goes from the person who has the disease to the one who has not, and then he has it also, unless he bats it instead of catches it.

There are two classes of infectious diseases, all of the germ diseases, and some others.

It is easy to explain why germ diseases are infectious. The germs (which are tiny plants or animals) pass from the sick person in the breath, the sputum or other waste, and are taken into other bodies through the various openings. This and mosquitoes carry germs from one person to hundreds of others.

There are some diseases, like the mumps, and measles, and scarlet fever, which have not been proven to be germ diseases and yet they are catching.

It may be that some day it will be found that they, too, are germ dis-

eases, and then it will be easy to explain why they pass from one to another.

One is less liable to be infected by disease if he breathes pure air, keeps his body free from waste, has plenty of iron in his blood, and drives fear away and fills his mind with happy thoughts.

Why Does Red Irritate a Bull?

Red, yellow, and orange are known as fatiguing colors, and of these three, red is most irritating. People who live in rooms with red walls are likely to become nervous or irritable from fatigue. The first colors to attract a baby are red, yellow, and orange. There seems to be something far back in animal history which makes red irritating and which makes a bull angry when he sees red. Some people think it is because red is the color of blood, but, while cattle are always excited in the presence of blood, it is probably the odor, rather than the color, which excites. It may be because it looks like fire which strikes terror to all wild and domesticated cattle and which was once a much feared enemy. Certain it is that if you wave a red rag at a bull he takes it as a hurry call in your direction and acts immediately upon the suggestion.

Why Does Yeast Make Bread Rise?

You know that in making bread you put yeast into the dough to make it rise.

But, did you know that if you left the dough alone yeast would come and get into it "of its own self"?

Not very many years ago people didn't know whether yeast was an animal, a plant or just a chemical compound made up of lifeless sub-

stances, but now we know that what we call yeast is a mass of tiny one-celled plants, round sacks with little grainlike centers in them, containing a pale yellow fluid. They grow or multiply in two ways. If the yeast cells have only a scanty supply of food they multiply by forming little spores, something like seeds, as the fern does. These spores of plants of the fungi family, as well as full grown cells, are continually flying about in the air, and when they come upon the kind of food they like best—a sweet liquid—they immediately set about growing new cells. Yeast cells grow by putting out buds of themselves.

In a very short time each bud breaks away from the parent cell, and itself becomes a mother-cell. Or it may do this before it breaks away from the first cell, so that the microscope shows you a whole chain of yeast cells attached to each other and still forming new ones. To produce new cells the yeast cell must absorb new material from the fluid which surrounds it. This it does by breaking up the sugar molecules and taking a tiny little bit of the material they contain—about one part out of a hundred—for nourishment. The other ninety-nine parts form new compounds—alcohol and carbonic acid gas—after being broken up by the yeast. The liquid containing the yeast gradually loses its sweet taste and takes on an acid or alcoholic flavor, bubbles of gas are seen escaping, and a scum of yeast plants rises to the top. You say the liquid has “fermented.”

But what has this to do with the holes in bread? Yeast is a mischief-maker in mother’s preserves, but we need it in the bread. We put the

yeast in bread because the dough cannot collect enough of the tiny plants from the air, for the work that has to be done. (Now you see the reason why the yeast is put in the bread instead of being allowed to get in of itself.) We said that in growing, the yeast plant makes carbonic acid gas. This gas is so impatient to get out of its heavy, soggy prison-house of dough that it carries some of the dough upward with it. If we put the bread in the oven while the gas is rising, the holes it makes will be baked in, which is just what we want.

Large quantities of yeast are made in breweries. It gathers on the top of big vats of beer, where it is used to turn some of the sweet barley liquor to alcohol. It is the yeast’s habit of turning sugar into alcohol that mother is guarding against when she is careful to fill her fruit jars brimful and screw the covers on tight. If there is any air between the cover and the fruit, or if some gets in from the outside, it is sure to have some yeast cells in it, and they will change the sweet fruit juice to alcohol, and the carbonic acid gas formed will make the cover come off with a “pop.”

It will often even break the glass jar, if you leave it there long enough!

What is Liquid Air?

That two-foot-high cylinder, very simple in construction, will make any quantity of the substance which baffled scientists for years and was thought to be impossible to produce—liquid air. The cylinder contains a closely coiled metal tube of great length. When things are in a liquid state they are denser, the molecules are closer to-

gether, than in the gaseous condition. So, in order to liquefy a gas, it is first made very cold. This makes it contract or draw its molecules closer together. Then it is compressed to help along this squeezing-together process. When a compressed gas ex-

panding it becomes very cold, and in so doing cools the compressed air in the tube. When the process is continued for some time the low temperature and the high pressure reduce the air in the tube to a liquid state.

Boiling Water With Ice



It looks strange to see a teakettle boiling on ice, doesn't it?

But, just wait—what makes it boil is stranger still. It's the ice; and the reason is that the ice is warmer—a great deal warmer than what is in the teakettle.

What is in the teakettle is not boiling water, as you suppose, but boiling air. And that's rather queer too, isn't it—that you can see air?

This air—the air in the teakettle—is a liquid; it's what is called "liquid air."

They make it in a cylinder containing a closely-coiled metal tube.

pands, it uses up a great deal of heat in getting back to its normal volume, so it will cool substances near it down to a very low temperature. In the apparatus for making liquid air, the air is liquefied by the extremely low temperature obtained when compressed air is allowed to expand to its normal volume. Compressed air is forced through the metal coil by a steam pump. It is allowed to escape into the cylinder and in ex-

When removed from the coil the liquid air boils away in an hour or so, but if it is put into a specially prepared container it can be kept for several days. This container is a glass vessel with double walls, having a vacuum chamber between. The inner walls of the vacuum chamber are coated with mercury, which makes the apparatus still less a heat conductor and so helps to maintain the low temperature.

The temperature at which air liquefies is -344 degrees Fahrenheit. It boils at -312 degrees, so we see it boiling furiously in the teakettle on the block of ice whose temperature, as you know, is 32 degrees. Water boils at 212 degrees, or 142 degrees above 70 degrees, the normal temperature in which we live; -312 degrees, the boiling point of liquid air, is over $2\frac{1}{2}$ times as many degrees below the normal temperature as boiling water is above it. If liquid air touches your flesh, it leaves a bad frost bite that takes considerably longer to heal than a burn. If a test tube full of whisky (which is largely alcohol and very slow to freeze) is lowered into liquid air, it immediately freezes and the solid whisky can be removed from the tube in one lump. A rose immersed in liquid air for a few minutes freezes so stiff that it can be crushed to powder. Rubber gets so brittle that a light tap with a hammer shivers it to pieces as if it were glass.

Air, as you know, is a mixture of nitrogen and oxygen. Nitrogen boils at -317 degrees, oxygen at -290 degrees, so the nitrogen escapes first, leaving at last almost pure liquid oxygen behind. Because of the higher boiling point of oxygen it was thought that liquid air would become commercially valuable as an explosive in mining operations. What we call burning is the process by which a substance unites with oxygen. When a fire cracker "goes off," this union takes place suddenly. Things ignite very readily when pure oxygen is present, and it was thought that a

sponge wet with liquid air, from which part of the nitrogen had boiled away, could be used instead of gun cotton to explode charges in mines. But the difficulty in handling liquid air, and its extreme instability, make it less practical than gun cotton.

Why Do Wheat Ears Turn Down at Night?

Wheat ears turn down at night to keep the dew from getting into the wheat heads, and to get the warmth that radiates from the earth at night. Too much moisture helps to cause smut in wheat.

Perhaps you have read Mary Howitt's story of the little girl and "The Fairies of Caldon Low." If so, you remember how some of these fairies

*".....seized the little winds
That sounded over the hill;
And each put a horn unto his mouth,
And blew both loud and shrill:*

*" 'And there,' they said, 'the merry
winds go
Away from every horn;
And they shall clear the mildew
dank
From the blind old widow's
corn.**

*" 'Oh! the poor blind widow,
Though she has been blind so
long,
She'll be blithe enough when the
mildew's gone,
And the corn stands tall and
strong.' "*

*Mary Howitt was an English poet, and wheat was called "corn" in England before American maize began to be cultivated by white people. For the same reason wheat is called corn in the English Bible.

THE HOW AND WHY OF COMMON THINGS INDIAN SUMMER

The Summer That Comes in Autumn



LATE in Autumn, usually in October, and after severe frosts, there is a beautiful season that lasts from ten days to three weeks. The weather is fair, still and moist, the air soft and hazy, the sunshine dim and sweetly diffused, giving a golden tinge to the air. Daniel Webster said the earliest colonists in America called the season "Indian Summer" because the Indians were especially fond of it. Then it was they opened the hunting season, and fired the prairies to start game. It was thought that the smoke of the fires caused the soft

haze. But Europe has a similar season. In England and France, where it occurs early in November, around St. Martin's day, it is called St. Martin's Summer. On the continent it is "Summer's Close," and it is thought to be the "Halcyon Days" of the ancient Greeks. Shakespeare speaks of the season as St. Martin's summer, and halcyon days.

*The Season
the Indians
Like Best*

How the Indians Accounted for Indian Summer

(From the Song of Hiawatha.)

Shawondasse, fat and lazy,
Had his dwelling far to southward,
In the drowsy, dreamy sunshine,
In the never-ending Summer.
He it was who sent the woodbirds,
Sent the Robin, the Opechee,
Sent the blue-bird, the Owaissa,
Sent the Shawshaw, sent the swallow,
Sent the wild-goose, Wawa, northward,
Sent the melons and tobacco.

From his pipe the smoke ascending
Filled the sky with haze and vapor,
Filled the air with dreamy softness,
Gave a twinkle to the water,
Touched the rugged hills with smooth-
ness,
Brought the tender Indian Summer
To the melancholy north-land,
In the dreary Moon of Snowshoes.

LONGFELLOW

The "Harvest Moon"

Late in September, about the time of the equinoctial, or "equal nights" storms, the moon rises, when near the full, just after sunset for several nights in succession. Just why the moon does this once a year is understood by astronomers, but we have not the space to go into the explana-

tion here. The moon at this time is called the Harvest Moon because it "holds the light" for the farmer to work by just when he is busiest with his harvest. It rises for several evenings about the same time by the clock, instead of as it usually does, fifty-two minutes later each day.

The Fields of Corn

*O'er many roods of restless blades
The sunburnt farmer goes;
And there till day's refulgence fades
He plows among the rows.*

*From purple eve to crimson morn
The furrows smile and grow;
The moon hangs out her silver horn,
And pours her light below.*

*Through sunny days and yellow weeks,
With clouds that melt in tears,
The glory of the harvest speaks
In all the silken ears.*

*The tassels spread 'neath cheering rays,
And plume the kingly form;
The furrows lift the creamy maize,
And greet the welcome storm.*

*When all the woods are hung with green,
And hills are strewn with sheaves,
When flowers blush deep where bees have
been,
The ears grow fast like leaves,*

*When fields of green turn sear and brown,
And woods grow rich with stain,
And orchards bend with pippins down,
And barns are choked with grain;*

*When Autumn hangs his sumptuous robes
Out in the glowing morn,
Which hides the lamps of distant globes,—
Then gleams the ripened corn.*

J. HAZARD HARTZELL

The Reasons Why of Many Things

Why the Birds Have a "Moving Day" Twice a Year

What makes the birds "move" so regularly twice a year? Where do they go, and do they come back again to the same nests each summer?

In the first place the distance covered in these yearly trips and the rate at which the birds fly make you open your eyes. Crossing a continent is not at all rare for these experienced little travelers.

Newfoundland to Mexico by the Humming Bird Route

The tiny butterfly-like humming bird journeys from Newfoundland to Mexico and back each year; and the cuckoo, like many other of his feathered kinsmen, crosses the Mediterranean in both spring and fall—wintering in central Africa, and spending the short summer nesting season in northern Europe or the British Isles. The pigeon averages a thousand miles a day on its "moving" trips, the swallow travels ninety miles an hour, and the big purple swift flies at the rate of two hundred and seventy-five miles an hour.

How do the birds know when moving day comes? Scarcity of food will not explain both moving days, because the birds leave

their winter homes in the Spring when there is more food there than in the colder North, to which they fly. "Instinct" tells the birds when moving day has come, you say, but what taught the ancestors of our birds the habits which they remember today as instinct? Here is what men who have studied it all out have decided: Thousands of years ago, before the great glacier covered part of our globe, its climate was different from the climate of today. Regions which are now

As the cold or temperate
Climate Grew were then much
Colder warmer.

The ancestors of some of our present birds lived in Canada, for instance, the whole year through. Gradually the climate grew colder. Food began to be scarce during one season of the year, and the birds found that by making short trips southward they could get the food that was lacking in the North. Of course the change took place very slowly, while hundreds of generations of birds lived and died. As the climate grew colder the distance covered and the length of their stay grew longer, until finally the long spring and fall moving days became a habit. The descendants of the early birds spend their summers in Canada still, but for the winter they move way down

to the Gulf of Mexico. The birds nest and rear their families in the cool north, because it was originally their home. There is proof that the moving instinct is being changed and new habits formed. Some species of birds now nest farther north than they did a hundred years ago, and a few have learned to stay all winter in their summer homes.

That the birds make a long trip over thousands of miles of land and water twice a year is indeed wonderful, but by marking some of them it has been proved that they even return to the same nests. They fly so high that the geography of the land below must be a blur to even their sharp eyes. How do they find their way back? Is there always one wise old bird in a group who remembers, and does he lead all the rest back? No, for the birds don't all come back in flocks. They come singly, in pairs or in groups of a dozen or so. The fact is, the birds have better memories than we give them credit for. They make the long journey back because they remember the former journey and last summer's home.

Why a Camel Can Go for Days Without a Drink

Did you ever wonder why they use camels in hot countries, to cross long, dry deserts? Why, the camel is used for that purpose so much that he is called "the ship of the desert!" You know in the desert men must take enough water with them to last for several days sometimes, because oases and springs are few and far between. The camel is the very animal to make this sort of a journey, because, before he starts, he drinks a great quantity of

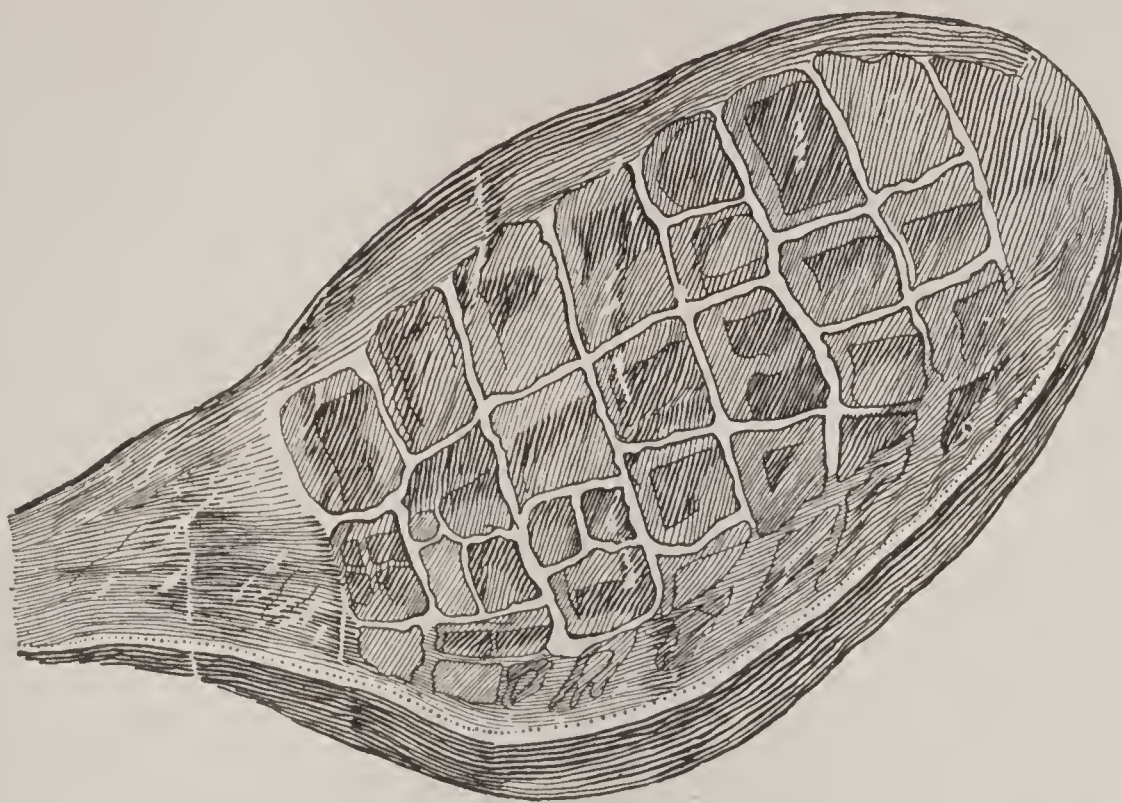
water which he stores away in one of his stomachs. Then he does not need any more water for from three to five days. Isn't that remarkable? The camel can live and work without water, because his stomachs are not one big bag like ours, but are arranged in pockets or pouches.

When he takes a long drink before starting on a journey, he fills these pouches with water. They are *so made* that they close up when full, and *only open* when the camel is thirsty—that is, when he needs the moisture stored away in them. This water in the camel's stomach makes no difference about his eating, because it is locked up, you see, until he needs it. He can eat all the grass and leaves that he can find and have a drink when he feels thirsty, too, though the springs of water may be several hundred miles apart.

These pockets in a camel's stomach close up when they are filled, because they have nerves in them which respond and close up as the sweat glands respond by opening when they are filled; or as the stomach, through this responsive action of the stomach nerves, is set in motion by the presence of food. Then the camel opens them up when he gets thirsty, just as the glands in your mouth are opened when you think about things so good to eat that they "make your mouth water."

There are other reasons why the camel is especially well fitted to travel across deserts. He is a large animal, able to carry much heavier loads than a horse, and to travel at break-neck speed for hours. He has big, soft-cushioned feet, that spread out on the top of the sand like snow shoes on the snow, instead of sinking into it, as hoofs or paws would do.

A Camel's Stomach Looks Like This



Here are the pockets in the camel's stomach. The telegraph system of the nerves tells them when to close up; that is to say when they are filled. You see they act just the opposite to the way in which a boy's pocket acts when it is full—of apples, say. The boy's pocket is wide open when it is full but soon gets empty. Then it closes.

He loves the hot sunshine, and prefers to take his noonday rest in it instead of in the shade of a palm tree with his masters. And he seems to know just what to do when the terrible desert storms called simoons come. He lies down with his nose to the ground and when the storm is over he gets to his feet again, blinks his docile, brown eyes, and seems to be none the worse for the ordeal. Don't you think the camel is a very wonderful animal?

The "Whys" of a Soap Bubble

Did you ever wonder at the beautiful, dainty mystery of the soap bubble? Why does it go floating off in space as if it were too fragile and fairy-like for the humdrum world of every day? Where did it get its ever-changing tints—delicate as the butterfly's wing and glorious as the sunset sky? The soap bubble is a little poem in the book of Nature.

The molecules of all substances

show cohesion, or the tendency to cling together. Water molecules are not very cohesive; they can be easily separated. But when soap is added and a lather made, the molecules have a much greater attraction for each other. A bubble of soapy water at the end of a clay pipe can be stretched to ten or fifteen times its original size, and the molecules will all still cling to each other. The soap and water mixture is stretched out into a very thin film by the pressure of the air inside. This pressure or pushing power is exerted evenly in all directions, so all parts of the watery film are held at the same distance from the center, and the bubble is round.

The heat of your body has made the air in your lungs warmer than the surrounding air. When this warmer air is blown into the bubble, it rises because warm air is lighter than cold. That's why it floats.

What makes the color of the soap bubble? The molecules of soap and

water are not perfectly round and they don't fit together evenly. There are thousands of little, flat faces and edges like those of a prism. These catch the light and break it up into the rainbow colors before sending it back to you. So the fairy colors of the soap bubble are just the sunlight taken to pieces by the tiny prisms of soapy water.

After the soap bubble has been in the air a few minutes it gets egg-shaped and sags toward the ground. There are two reasons for this. The gravity or pulling power of the earth is dragging it downward and the

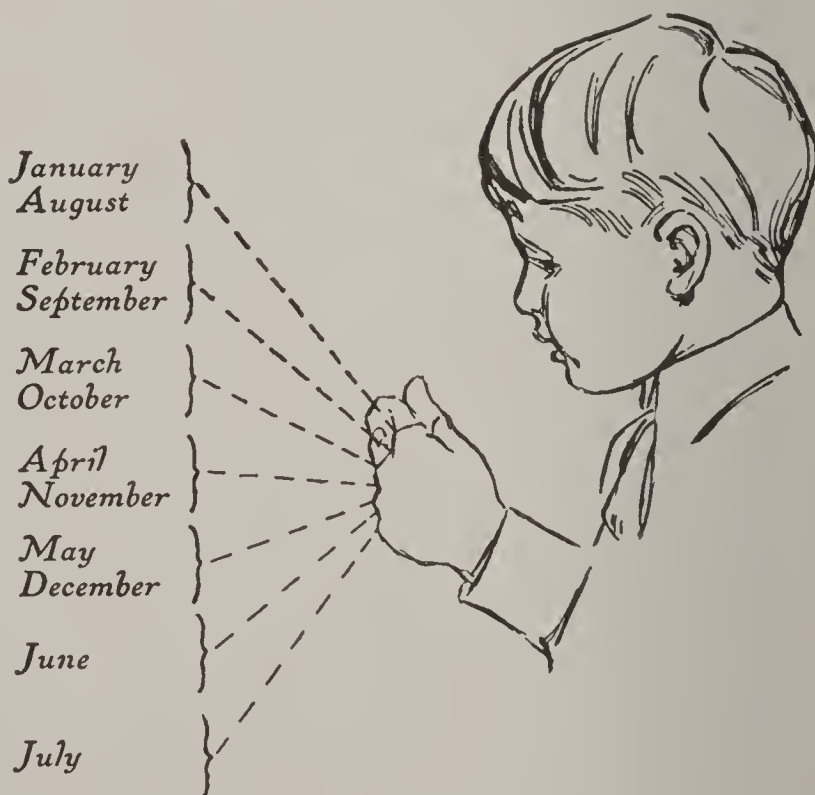
water, obeying this call, slips down the rounded sides and collects in a drop at the bottom. So, because the greater weight is at the bottom, the bubble loses its roundness and becomes oval.

Finally the air in the bubble cools and contracts, which also causes the bubble to sink. It is no longer lighter than the surrounding air. Finally it bursts in a wet little splash. The wonder world has vanished in the winking of an eye in true fairy fashion. But isn't it good of Mother Nature to make fairy worlds out of soap and water?

How the Months Got Their Names

This little boy hasn't been going to school very many years. His teacher put the names of the months on the blackboard and told the children to learn them. That is what he is doing. He is counting out the months on the knuckles and depressions of his closed fist, until he gets to July. Then he will begin all over again. In naming over the months in this way the knuckles stand for the long months, the depressions for the short ones.

Wouldn't you like to know how the months got their queer names? Perhaps you already know that we got our calendar, our way of dividing the year into twelve months, from the Romans. They worshipped many gods. One of them was Janus. He was a queer god with two faces, one looking forward into the future and the other backward into the past. He was the god of beginnings and ends. So you see it was



The knuckles stand for the long months and the spaces between for the short ones.

very natural for the Romans to name the first month, the *beginning* of the year, January, in his honor.

In the second month of the year the Romans celebrated a great feast of purification called Februa. This was such an important event to them that they named the month in which

it happened in honor of it—February.

March is named for the great, strong god of war, Mars. Possibly they thought the stormy weather and angry winds which come then were like their fierce god Mars. At any rate they held a big feast in his honor at that time.

It is uncertain where April got her name. Some scholars think it came from the Latin word *aperire*, "to open," and was given to this month because green things open and bud at this time of year. Others say "April" comes from the name of the Greek goddess of love, Aphrodite, whom the Romans adopted as their own.

May was named for an old Roman goddess, Maia, and June for the queen of the heavens, Juno. We still think June the best month to be married in partly because the Romans believed Juno to be the goddess of

marriage. The custom has survived.

"July" comes from Julius, the name of the great Roman general and statesman, Julius Caesar.

"August" is for his nephew, Augustus Caesar, who ruled after him. The calendar first used by the Romans made March the first month of the year. According to that count, September would be the seventh month instead of the ninth. So they named the month from the word "septem," meaning seven. In the same way, October comes from "octo," eight; November from "novem," nine; and December from "decem," ten. The calendar was changed somewhat by the early popes of the Christian Church. They took a day from some months and added one to others, but though they no longer respected the old gods of the Romans, they continued to call the months by the names which everyone knew.

What Is "Standard" Time?

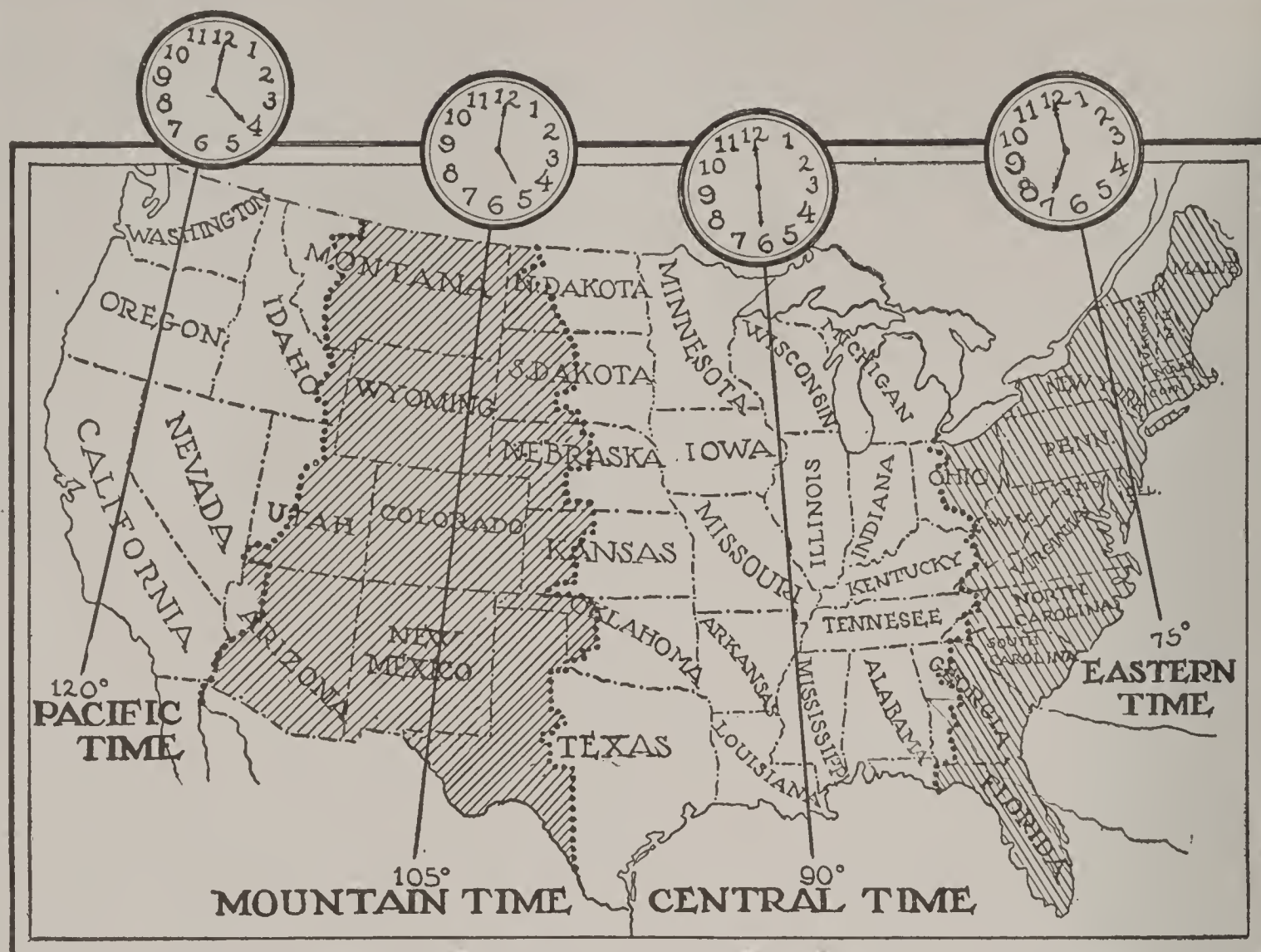
When the sun is directly overhead at any place, so that no shadows are cast to the east or west, it is noon on that line or meridian, from the north to the south pole. East of that line it is afternoon or evening, west it is forenoon or morning. Every place, east and west, has a different time. These small differences, making a total of three hours between New York and San Francisco, were troublesome when it came to making up railway time tables, and running trains.

So, about thirty years ago the United States decided to divide our country, north and south, into four

time bands, giving each one a standard time. It was agreed that the astronomical observatory at Greenwich, near London, England, should mark time for the world.

*Straightening
the Accounts
of the Hours*

Exactly five hours after it is noon at Greenwich, it is noon by the clock in our eastern states. In that band it is called Eastern time. The Mississippi valley has noon an hour later, or six hours from Greenwich. That is called Central Time. A thousand miles west of Chicago noon is seven hours from Greenwich. That band has Mountain Time. And on the Pacific coast, Pacific Time, is eight



hours from Greenwich. If you take a journey from Chicago to New York, when you arrive there you would have to set your watch for-

ward an hour. In going to Denver you would set it back an hour; and when you reached San Francisco, another hour.

Pictures and History in Our State Names

MANY of our states bear the names of the Indian tribes that once lived in them, or names with poetic meanings given by the red men. Massachusetts means "the great hills," Connecticut "the long river." Alabama was the name of an Indian tribe and of its hunting ground meaning "here we rest." Mississippi is "the great long river," Tennessee "river of big bend" and Kentucky "head of the river." Ohio means "beautiful." In-

*Big Pictures
in
Little Names*

diana is from Indian, Illinois is disputed. It may be a combination of Indian *Illini*, "men" and French *ois*, "tribes." But some think the name Spanish *Il lanos*, "the plains" or "prairies." Michigan is "big sea water." Wisconsin means "wild, rushing water," Minnesota "cloudy water"; Iowa "across," referring to the Mississippi, beyond which it lay. Missouri is "muddy," Nebraska "water valley." Kansas is "smoky water" and Arkansas "a bow or bend of smoky water." Texas signifies

"friend" or "friendly," Oklahoma is "beautiful land." The Dakotas are named for the "leagued" tribes. Idaho is "gem of the mountains" and Wyoming "broad valley." Utah is "mountain home." The meaning of Arizona is thought to be "little creeks," and the word to be a corruption of the Prina Indian "Orlison." New Mexico was named by the Spanish after Old Mexico, or Mexico City. "Mextil" was the name of the Aztec Indian war god. Oregon is "beautiful water."

Except Washington and the District of Columbia all the other states were named by the early English, French and Spanish explorers and colonizers. The French named three states—Maine, New Hampshire and Vermont, which were once claimed as a part of Canada. Maine was named for the French Duke of Maine, and Vermont, once including New Hampshire, is French for "green mountain." Louisiana was named for King Louis XIV. Delaware, named for Lord de la War, a colonial governor of Virginia, is the Norman French name of an English noble family of Norman descent.

New Hampshire was named for Hampshire county, England. Rhode Island, first given to an island in

Narragansett Bay, was named for the beautiful Greek island of Rhodes, New York was named for the Duke of York, afterwards King James. New Jersey was named after the Island of Jersey in the English channel. Pennsylvania is the Greek form of "Penn's Woods," and was named for William Penn. Maryland was named for Queen Henrietta Maria, wife of Charles I, and Virginia and West Virginia for Elizabeth, England's unmarried or virgin queen. North and South Carolina were named for King Charles I. Caroline is the feminine form of Charles. Georgia was named for King George I.

In the eastern part of our country Florida alone has a Spanish name. Discovered on Easter Sunday, the flowery land was named *Paescua Florida* or "feast of flow-
ers." Colorado is a Spanish name first given to the river, for the fiery colors of the rock walls of the great canyon. Montana is Spanish for "mountainous" and Nevada is "snowy," first given to the Sierra Nevada mountains. California is the name of an imaginary island in old Spanish romances. It is today our American wonder, or fairy land.

History
in State
Names

The Fairy
Land of
California

"Uncle Sam" and "Brother Jonathan"

When the War of 1812 was being fought with England a contractor went to Troy, New York, to buy provisions for the Government. All the goods had to be inspected by two brothers, Ebenezer and Samuel Wilson. The latter was called "Uncle Sam" by everyone who knew him,

and he put "U. S." on the packages instead of S. W. As U. S. also stood for United States the story was widely told as a joke. Some comic artist drew the cartoon we know so well today as "Uncle Sam." He is a long, lank Yankee; and, of course, dressed in stars and stripes.

Sometimes the expression "Brother Jonathan" is used in this way. When General Washington went to Massachusetts to take command of the army of the Revolution he found himself short of means of defense. Jonathan Trumbull was then Governor of Connecticut. He was an

able and resourceful man, the typical Yankee. Washington, having great confidence in him, said: "We must consult Brother Jonathan." All through the war "Brother Jonathan" helped overcome every difficulty. So the phrase spread and became Uncle Sam's nickname.

Uncle Sam—"His Mark"

IN ancient times, when few people could write, seals were designed for stamping papers such as treaties, deeds and agreements. All kings, nobles and heads of important families had seals. Emperors, popes, cardinals, and public officials wore signet, or signing rings, for stamping wax seals. The cities and nations adopted seals. They usually had some animal on them, a motto, and other devices connected with the history of the family or state.

Soon after the Declaration of Independence was signed a committee of congress was appointed to select a design for a colonial seal. Jefferson, Franklin, Adams and a dozen other men had suggestions, and twenty or more designs were rejected. It was 1782 before our seal was adopted. This is what it is:

On a circular disc appears the bald-headed American eagle, with spread wings, tail and feet. One



Pen Picture
of the
Great Seal

claw holds an olive branch in green, the other a bunch of silver arrows. The olive branch signifies peace, the arrows war. In the beak is a ribbon scroll bearing the motto: *E Pluribus Unum*, "many in one," or "one out of many." On the eagle's breast is a shield of seven white, and six red perpendicular stripes, on a blue field, standing for the thirteen colonies. Above the eagle's head is a constellation of thirteen silver stars in a golden halo, surrounded by clouds, signifying that a new nation had risen. Of the colors in the shield, red stands for valor or bravery, white for purity or truth, and blue for vigilance and justice. It is thought that the shield was based on Washington's coat of arms. Ancient Rome used the eagle, and so do Russia and Germany today. But it is thought that we chose the bald eagle as the bird of freedom, because the Indians held it in

honor and wore its feathers. Franklin wanted to use the wild turkey, others the beaver. One suggestion

was a harp of thirteen strings.

Do you know the seals of your city and state, and what they mean?

National and State Flowers

MANY countries have a national flower; and a number of our states have adopted a flower, either by act of the legislature, or by the votes of school children. Several times efforts have been

What Do You Think of Golden Rod made to have the United States choose a national flower, but this has not been done. Among all those proposed the golden rod has had the greatest number of champions, because it grows everywhere, is hardy, decorative, and is a composite, or many-in-one flower. But as national flowers have become dear through some historic incident, it is thought happy accident may settle the question for us some time.

England got her Tudor rose when the wars of the red and white roses of Lancaster and York came to an end. Scotland's thistle, filling a trench, won a battle for the Highlanders. St. Patrick used a shamrock leaf to explain the Trinity to

Flowers of Foreign Countries Pagan Ireland. The flower of Ancient Athens was the violet; that of Egypt and India, the lotus or water lily. The flower of Japan is the chrysanthemum; of France, the

fleur-de-lis or flag lily; of Spain, the pomegranate; of Persia, the rose; of Germany, the corn flower. This is the blue, ragged robin that grows in wheat fields. In Germany it is called the kaiserblue or king's flower. The cactus, or prickly pear, is the flower of Mexico; the edelweiss of the Alps, of Switzerland.

The Flowers of Our States New York and Nebraska have chosen the golden rod; Vermont, red clover; Maine, the pine tassel and cone; Michigan, the apple blossom; Kansas, the sunflower; Oklahoma, the mistletoe; Minnesota, the moccasin flower, or yellow lady's slipper; Montana, the bitter root; Colorado, the white and blue columbine; Oregon, the native grape; Idaho, the syringa; Utah, the sag lily; California, the yellow poppy; Washington, the rhododendron (an azalea); Nevada, the purple sage; Georgia, the Cherokee rose. Has your state a flower? If not, find out the most beautiful and most common wild flowers in the state and vote on it. Ask other schools and clubs to vote, too. Pennsylvania could claim the mountain laurel, Massachusetts the fringed gentian.

Like a Cup for the Big Sea God



Such huge sponges as this are found off the coast of the East Indies. You can see why they are called Neptune's Cups from the shape and from the size—often over five feet. Who but such a huge creature as the fabled god of the sea could use such a cup?

Big London and the "Little Londons" Under the Sea



ONE of these pictures shows the heart of London; the other the heart of a sponge. Isn't it curious how much they look alike?

What we call a sponge is really the skeleton formed by little animals who live together just as London is made up of a lot of people who live together. Wouldn't it seem funny to divide the use of your skeleton with a lot of neighbors instead of having a little skeleton all your very own as you do now? The sponges of a sponge community all have one skeleton. The holes in the skeleton are like the streets of a town. In their home on the floor of the ocean the water is continually flowing in and out of these streets. The sponge people pick up their food from this water.

The streets in the old part of London just grew anyway, as they do in Spongetown. The streets were never laid out, as they are in a "spick and span" new suburb of a city to-day. You can tell that by the names

of such streets as "Cow Cross Street," which is one of those shown in our diagram of the streets of the heart of London. In our picture are also shown such famous thoroughfares as "Fleet Street," "Holburn Street," "Paternoster Row," "Poultry Lane" and "Threadneedle Street." Get a plan of the streets of London, such as you will probably find in any big encyclopedia, and see how many of these streets you can make out. Most very old cities are like Londontown and Spongetown—their streets wander about in all directions. Like London, they grew up slowly at first, were added to bit by bit, as people happened to want to build at the time. Boston is an example of such a city in our country. There is a locality known as "The Common," which was originally the common pasture ground for all the village herds. And there is a "Duck Lane Place." Don't such names tell you that Boston was once nothing but a little village?

Andrew Carnegie in His Library



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Like James J. Hill, Andrew Carnegie believed in gaining a large store of knowledge by reading good books. He said that when he was earning his way in the world, he was too busy reading, during his leisure hours, to waste time and money in dissipation as other young men did.

The result was that he not only improved his mind but he saved his money; and, as he said, became "partners" with his father and mother in running the finances of their little household. Then he invested some of his savings in business and got to be a great steel manufacturer with an income of millions of dollars a year. Much of this money he gave away to found the Carnegie libraries; beautiful stone buildings full of beautiful books which you will find in cities large and small, all over the country.

THE HOW AND WHY OF COMMON THINGS

HERO FUND

What Is the Hero Fund?



The Carnegie Hero Medal

The picture shows both sides of the Carnegie hero medal. The blank space is for the name of the man or woman to whom the medal is awarded.

MR. ANDREW CARNEGIE thought, as do many other people, that wars should stop, and that there are plenty of opportunities to do brave deeds without fighting battles. To keep people reminded of that fact, he decided to honor and reward heroes of peace. In 1904 he appointed a commission of men to use the income of \$5,000,000 for this purpose. This commission awards gold, silver and bronze medals for different degrees of heroism, gives sums of money, and pays pensions to poor or disabled heroes or to the families of brave people who have lost their lives in trying to save others. The fund has been drawn upon to relieve suffering in cases of fires, floods, mine and factory explosions and earthquake disasters.

Some of the Heroic Deeds Rewarded

The acts for which medals and money have been awarded, include saving or trying to save others from drowning, burning, freezing, suffocation by gas, electric shock, railway, street car, automobile, mine and factory accidents; landslides, quarry explosions, buzz saws, vicious bulls, mad dogs, snakes and suicide. Hundreds of people are today proudly wearing hero medals; men crippled or blinded by brave deeds are living in comfort, and orphaned children are being educated on the hero fund. Any one who witnesses a brave deed should report the exact facts to the Carnegie Hero Fund Commission, Carnegie Building, Pittsburgh, Pennsylvania. The case will then be investigated and award made.

*Heroes Not
Allowed
to Suffer*

trick shock, railway,
street car, automobile,
mine and factory ac-

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The Nobel Prizes for Great Achievements



Alfred Bernhard Nobel, Founder of the Nobel Prize Fund

This is the famous Swedish engineer who invented dynamite and smokeless powder. Mr. Nobel founded the fund from which the Nobel prizes are awarded. They are given to men of any nationality for great and helpful achievements in science, literature or the promotion of world peace.

When Alfred Bernhard Nobel, the famous Swedish engineer and inventor died, in 1896, he left a fund of around \$9,000,000, the interest of which is used in awarding five annual prizes. Having had a long, hard struggle before winning fame and fortune by his invention of dynamite, smokeless powder and other

explosives, Mr. Nobel had the fact impressed on him that scientific men, literary geniuses and reformers, who do most to uplift the world, are often paid the least. So the Nobel prizes are awarded to the persons making the greatest discoveries in physics, chemistry and medicine, to the one

*Rewards for
the Men
Who Help*

who writes the most distinguished and uplifting book of the year, and to the one who does most to promote peace among nations. These prizes, which amount to about \$40,000 each, are awarded by scientific and literary academies of Norway and Sweden, and are given to people of all nations. Among Americans the peace prize was given to President

Roosevelt in 1907 for his work in bringing the Russo-Japanese war to an end. Professor Michelson, of the University of Chicago, was given one of the prizes in physics for his improvements in optical instruments. Most of the medical and scientific prizes have gone to Germany. Literary awards are widely distributed, one going to Rudyard Kipling.

The Hague Peace Tribunal

THIS is an international court for arbitrating disputes between nations. It was founded in 1899 by the delegates from twenty-six countries that held the first great peace conference at The Hague, Holland. In 1903 Andrew Carnegie gave to the government of The Netherlands the sum of \$1,500,000 to build a Palace of Peace at Zorghvliet, a beautiful wooded park near the capital. And in 1910 he created a fund of \$10,000,000, the income to be used to hasten the end of wars between nations. In the second conference, which met in 1907, forty-four nations took part, including the United States, Great Britain, France, Germany, Italy and Japan. Each country represented has from one to four representatives on the court.

By 1913 twelve serious disputes between countries were settled peaceably, exactly as private differences are settled in our courts. The United States set the example of peace in 1902, by asking The Hague Tribunal to arbitrate a difference with Mexico. National debts,

boundary lines, tax cases, war indemnities, fishing rights, claims of injured citizens in foreign countries, and even such a serious matter as the seizure of French ships by the Italian navy, have been decided peaceably.

The Peace Movement a Century Old

Work for peace among nations was begun a century ago, in the founding of the New York Peace Society in 1815. So many states were in the movement by 1828 that the American Peace Society was formed. Peace jubilees were held throughout the country in 1871. The first international peace conference was held in London in 1843. Since 1889 they have been held nearly every year in various European capitals. That of 1893 was held in Chicago, in connection with the Columbian Exposition. Up to the outbreak of the Great European War, Peace Day, or Hague Day, was widely observed in many countries on the eighteenth of May, and the Sunday before Christmas is kept as Peace Sabbath in churches. Mr. Carnegie's gift of a home for the court, insures continuance of the work.

The Red Cross Societies

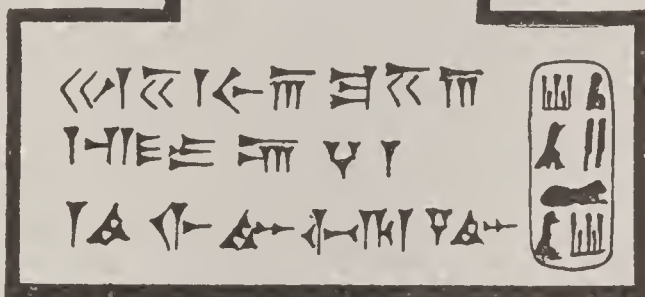
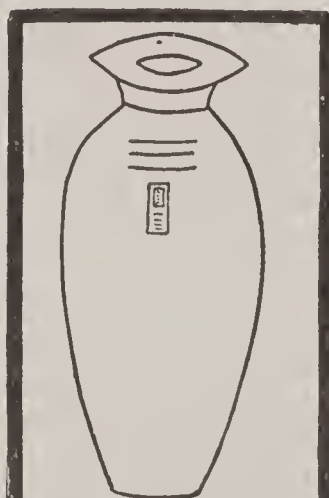
THE first red cross societies were formed by delegates from a number of European countries that met in Geneva, Switzerland, in 1864. Their objects were to collect money and supplies, train nurses and equip field hospitals to care for the sick and wounded in camps and on battlefields. Ten years before, in the Crimean War, Miss Florence Nightingale had, with nine trained nurses, organized the first field hospital nursing at Scutari, Turkey. And at the time of the Geneva convention, Miss Clara Barton was doing similar work in our Civil War. But it was M. Jean Durrant, of Geneva, who suggested the formation of societies as permanent bodies, always in readiness for such work.

The plus sign (+) or red cross on a white field was adopted as a badge for all societies, to be used on ambulances, on the sleeves of

nurses' uniforms and on stationery. Every civilized country now has a Red Cross Society, each national and independent, but keeping in touch with each other through conventions and bulletins issued by the central committee in Geneva. The American Red Cross Society was formed in 1881. Miss Clara Barton was elected president, and was continued in office until 1904. Several million dollars have been collected and wisely expended by our society. The work now includes the navy and has been extended to giving relief in such calamities as earthquake, fire, flood and epidemic diseases. When necessary the navy and war department co-operate with it. Relief funds are always entrusted to it by states, cities and individuals, and the society always keeps a large sum of money in its vaults at Washington, so as to be ready for any emergency.

How the World Made Its A B C's

THE earliest attempts to represent thought to the eye were made through picture writing, by every people that became civilized. A rude sketch of anything stood for the object. The shapes of the letters and their names, came from such pictures. The Hebrew name for A is aleph, which means ox. The Greek name is alpha. M was for mem, water, the form representing ripples or waves. O in Hebrew is ayn,



only a variation of K, and soft C of S. There are some letters that we could get along without today. The Greeks had twenty-two letters at first, then twenty-four. The Latin alphabet, from which we got ours, had, originally, only twenty-one letters. There was only one letter for U and V, one for I and J. Y and Z were not used at all. Z, J, W, U and V were added later, giving us twenty-six letters.

When Letters Were Pictures

American Indians, when discovered, were in the picture-writing stage.

The Chinese people have a national literature written in sign words.

After picture writing, symbols were used to express ideas, as an eye, or O, for seeing. Then the symbols began to stand for

Letters Used as Symbols

sounds, first for entire words, afterwards for syllables and single letters.

The Phoenicians, it is thought, made the first alphabet. The Greeks, Romans, Arabs and Hebrews improved upon it, each making a different one to represent the language spoken. For instance German speaking people pronounced W like V; the Chinese have trouble with R, pronouncing it L, saying "velly" for "very."

In early alphabets there were only sixteen letters. New letters were added to make clearer distinctions between sounds. K was once expressed by hard C; F by PH, as it still is in many Latin words. Q is

Two letters representing the soft and sharp sounds of TH were once in the Anglo-Saxon alphabet but were dropped. Fifty alphabets are now in use, varying in the number of letters and order of arrangement. They all have vowel sounds, labials or lip letters, like B; palate sounds like K; dental sounds like S and liquids, like L. The word alphabet, comes from the first two Greek letters: alpha and beta.

Our first illustration shows one of the urns in which ancient people kept the ashes of their dead. This urn contained the ashes of the great Persian King Xerxes. At that time Persia was a very great country, extending over not only what is now Persia but Assyria, Babylonia and Egypt. So the ashes of Xerxes were marked in the four kinds of "A B C's" used by these four nations. Each one of these inscriptions reads: "Xerxes, the Great King." The place of the three par-

Inscription on the King's Ashes

allel inscriptions is shown by the three lines on the vase. Below them was the inscription in Egyptian picture-writing. The other three inscriptions were in what is called cuneiform letters.

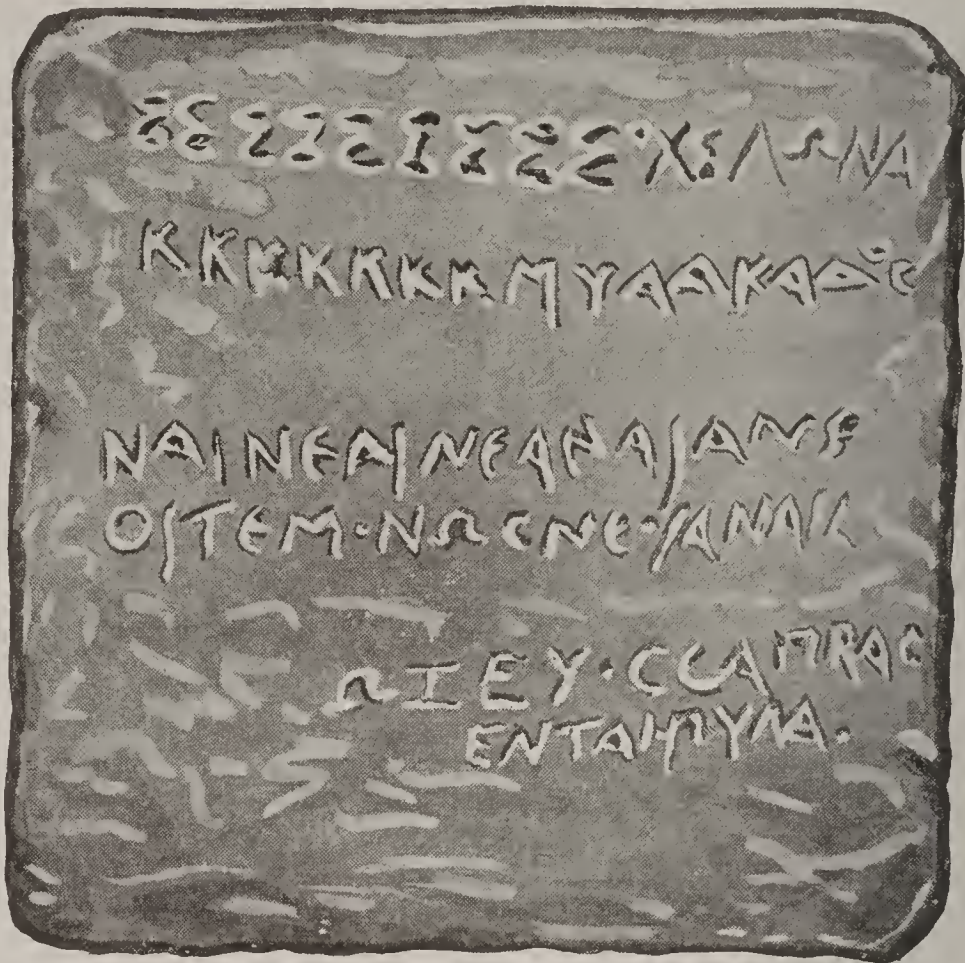
How do you suppose they got this curious form? You know when you make a straight stroke with your pen the mark is broad at first and then tapers off. This style of lettering originated in the same way. Over 6,000 years ago, in the countries where they had no paper to write on, but plenty of clay, they made clay tablets and lettered these with a writing instrument made of iron or bone such as the Romans called a stylus. The stroke of the stylus made these wedge-shaped lines just as your pen does. The word "cuneiform" comes from a Latin word "cuneus" meaning "a wedge." The word "cuneus" made the picture of a wedge on the mind of a Roman boy. You see he not only talked Latin but *thought* in Latin. These cuneiform letters were made from left to right just as ours are, and not from right to left as the Hebrews wrote nor from top to bottom as the Chinese write on our laundry bills and have been writing in their own country for centuries and centuries.

It was by such inscriptions as this, where the same thing was said in several different languages, that

How Word scholars learned to read
Secrets Were the languages of people
Discovered who long ago perished from the earth. Knowing the meaning of one language they had the

key to the alphabet and words of the other languages. You know when boys and girls write to each other in cipher it is very easy to

How Little Greeks Played "Peter Piper"



read if you get hold of the key.

This story of the writers in clay recalls the incident of ancient school-boy days told on a brick found in Sicily. At the top of this brick you see a row of capital S's (as the Greeks used to make our "S") and under it what is now our letter "K." Each row is written ten times. Below this were the Greek words for "turtle," "mill," and "pail," all carefully marked into the clay by the little hand of a Greek boy on his way to or from school 1,700 years ago. Below in another handwriting—evidently that of an older boy—is this:

"Nai neai nea naia neoi temon, hos neoi ha naus."

Translated this means: "Boys cut new planks for a new ship that the ship may float." You see, in the

original language, so many of the words are alike that it would be hard to say very fast. That is why the Greek boys used to try to say it as fast as they could; just as you

say, "Peter Piper picked a peck of pickled peppers." Isn't it interesting to learn that the amusements of Greek boys were so much like the amusements of boys today?

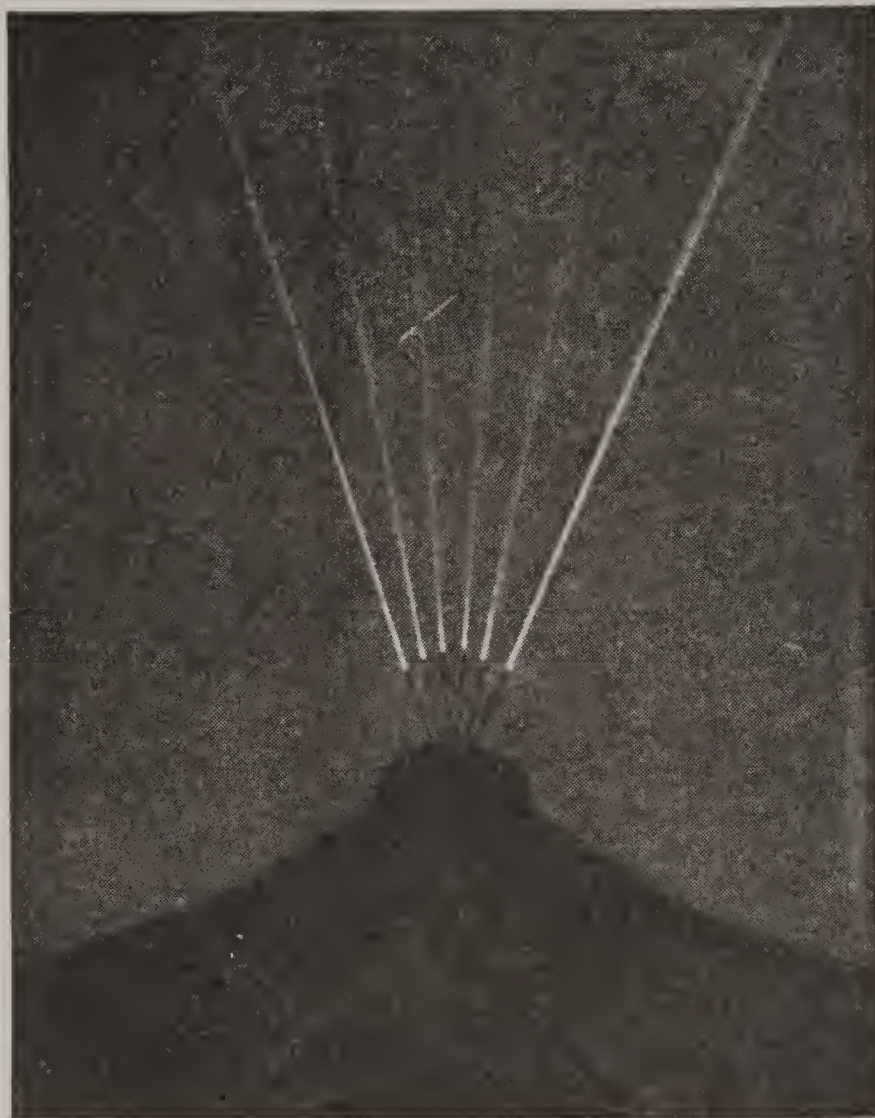


An Eskimo's Story of His Hunting Trip

This is an example of the kind of picture-alphabet the Eskimos use in writing to one another. This picture writing was done by an Eskimo who had started out on a hunting trip. He wanted to keep a friend of his, who was to follow him, posted as to the route he had gone and what had happened on the way. The waving lines indicate the shape of the country over which he traveled. On the left you see him starting out; then he leaves a stick with a bunch of grass to show the direction he has gone and you see where he has stopped with a friend over night. That little figure near the stick represents an Eskimo house. Next morning he discovers game on a neighboring hill. The division of days of travel are shown by upright lines such as the one you see here.

THE HOW AND WHY OF COMMON THINGS WIRELESS TELEGRAPH

How the Wireless Telegraph Works



"It's Midnight" Says the Wireless

In cities clocks are connected by wire with the telegraph offices and corrected hourly. Wireless telegraphy is employed for a similar purpose in regulating the clocks of the world. This picture shows Greenwich time being sent out at midnight from the Eiffel Tower in Paris. The ultra-violet rays from the antennæ show white on the photographic plate.

FROM sending a number of telegraphic messages over one wire, men began to think that perhaps no wires at all were needed. Electric waves travel through the air, as light rays travel. They go through dry earth, wood and many other things, and are carried, or conducted, from one point to another by copper and other metals. Experiments in wireless telegraphy were begun by the British postoffice about 1885,

*Wonders of
the Wireless
Telegraph*

and messages were soon being sent to lighthouses six miles from the shore. Much was discovered by others, but the instruments now used were perfected by the Italian Edison, Signor Guglielmo Marconi. Wireless messages are now sent across the Atlantic ocean from towers with long wires that run into the earth. The electric spark is made in a transmitter. When a key is pressed a succession of electric waves, in dots and dashes, is sent out. They shoot

BIGGER WHYS

Wireless Messages Sent From Trains and Ships



If you were riding to town with your father and a load of wheat and should call to a friend in the fields as you passed and got his answer back, you wouldn't think it strange, would you? But suppose you were whizzing along at sixty miles an hour on a railroad train, between Chicago and New York, and could talk with people in either city, that would seem rather like a fairy tale, wouldn't it? The people who really do this do not think it strange—at least not any longer, for they are important business men and have grown used to it. The talking is done by a wireless on a specially equipped train. Here you see the ends of two cars on one of these trains and no doubt you at once recognize the wires that send the messages through the air from the train and catch those coming in.

Uncle Sam's Ships and the Wireless



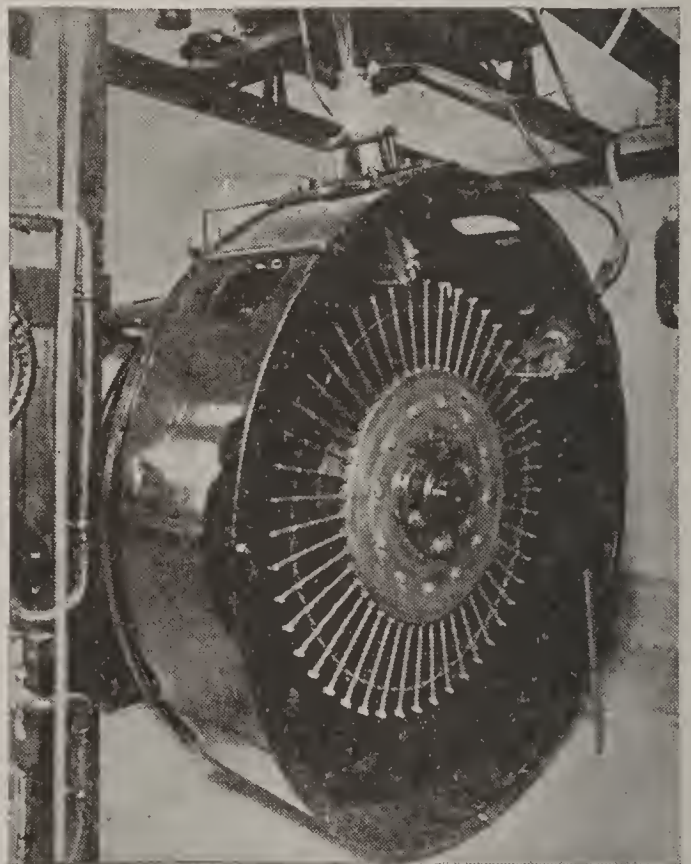
One of the most important fields for wireless telegraphy is on the ships at sea. If you are traveling on an ocean liner you can send an ocean letter (only it had better not be long for it costs a lot!) back home. If you are a business man you can get the stock quotations instantly and you can still keep in touch with all the world by reading the newspaper printed on the ship, which gets its news by wireless. The wireless is also used in the navy between ships of the fleet.

The Tower, the Power, and the Spark Gap

The pictures on this page show three interesting things connected with wireless telegraphy—the base of one of the towers that support the wires or antennæ, the plan for making the electrical waves that carry your messages through the air, and what is called the “spark gap.” The base of the tower, you see, is solidly fixed on concrete. The electricity is made with dynamos as is the electricity for furnishing the electric lights and running the trolley cars. The drum-like affair—the last of the pictures—is called a spark gap because it is inside of it that the



into it. Heat, light, and electricity are all forms of wave motion and the great Italian inventor thinks that it will be only a question of time when we shall have wireless light, wireless heat, and wireless electrical power.



sparks of electricity are made and go out from those points to the aerial to start the vibrations.

If you have ever visited a wireless station in the winter time, you will think there must be water in the steam radiator—there is such a continual hammering. This noise is made by the busy sparks in the spark gap. These electrical waves from the sending instrument go up to the top of the tower over wires and then “jump off” as it were into space, moving away in all directions.

Marconi says these waves are like the ripples made in the water when you drop a pebble

away in every direction, as do light rays from a lamp. These sparks are caught and the dots and dashes repeated on receivers in distant towers and on ships at sea. The receiver is a cigar-shaped glass tube

*How Sound
Spreads
Like Light*

with two silver plugs across the middle, separated by silver filings, and connected by wire to the ordinary telegraph instrument. When electric waves strike the filings they go on through the plugs and wires. Tapper and recorder do the rest.

How Wireless Talks Are Overheard

One trouble with wireless telegraphy has been that all instruments within a certain distance of the sending station get all messages. As many messages are private, and should be kept secret, such as government war orders, experiments are being made to tune the instruments, so that only instruments of the same musical tone can receive each other's messages. Increase of speed is being worked for, too. Wireless messages cannot be sent as rapidly as

those over wires. All war ships and naval stations of the great nations now use wireless telegraphy. So do ocean liners. When the "Titanic" was sunk by an iceberg, wireless calls for help were received by ves-

sels a hundred miles away. One ship reached the scene of disaster in time to pick up hundreds of people from life boats. Some day, we hope, wireless telegraphing will be so easy and perfect that all our wires can be taken down.

This will mean a great saving of wood and wire.

Wireless Towers



How Words "Ride" in Wire

YOU know how a door bell is rung by pushing the button. The wire is connected with a small electric battery in an ordinary jar. When the button is pushed the circuit is completed. It is much the same in sending a telegram. The wire may be hundreds of miles long, but a big battery supplies the current, and when the operator presses the key of the instrument a sound is made by an electro-magnet on the distant receiver. First, the operator calls, or gives the signal for the station he wants, much as you ask for a number over a telephone, only he calls by long and short pressure of

*Calling
by
Clicks*

the key. Every one on the line hears each signal, but only answers his own. By playing on the key in different combinations of dots and dashes, words are spelled.

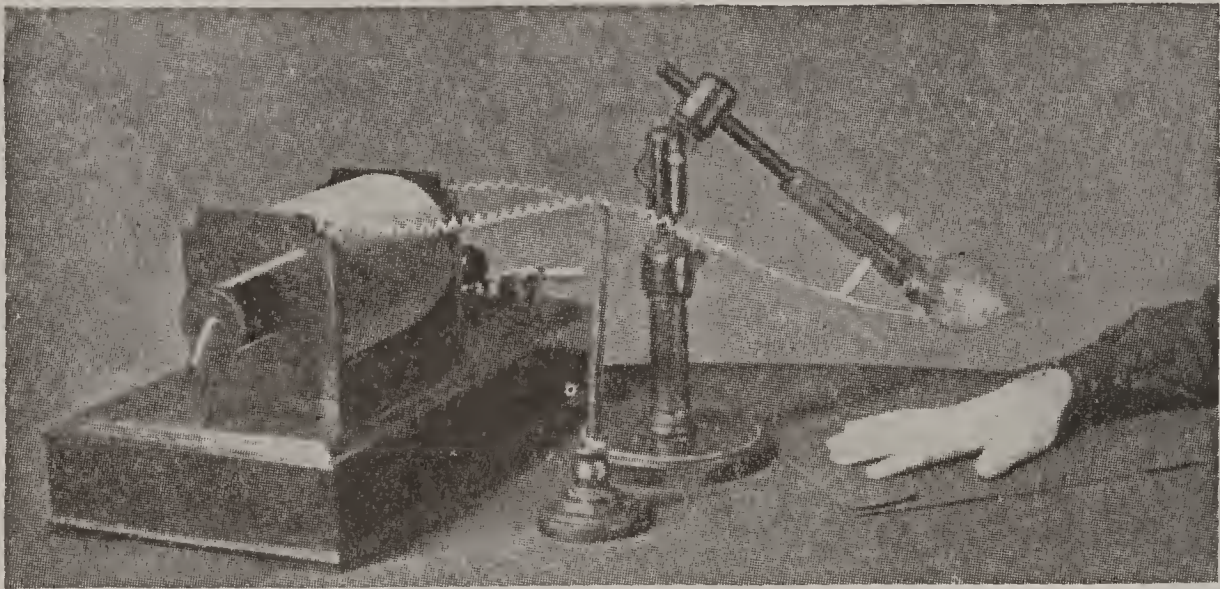
This is turning shorthand writing into shorthand talking. It seemed very wonderful when a way was discovered to send two messages at the same time, *Don't "Bump"* in the same or opposite directions, over one wire, without getting them mixed up. But now four or more messages, both ways, are easily sent, simultaneously. A deaf and dumb operator could take the messages, for they can be received on a typewriter.

*And the
Messages
Don't "Bump"*

THE HOW AND WHY OF COMMON THINGS

THE X-RAY

What Are X-Rays?



The Light That Goes Right Through Your Hand

This is how they take a photograph of the inside and the outside of a hand, both at the same time, as shown on the next page. The cylindrical affair on the left is what is called an "induction coil" and produces the electricity. This is conducted by the crooked wire, as you see, to what is called the "focus tube" immediately above the hand. In this tube it is converted into the X-Rays, which have the mysterious power of shining through objects.

WHEN boys and girls get into High School they study Algebra and learn that X is the name given to the "unknown quantity." Doctors have a wonderful helper, a kind of light ray that is made by an electric current, but they don't know very much about it—what it is or how it works—so they call it the X-ray.

It is made by an electric current passing through a glass tube called a "Crookes" tube for the eminent English scientist who discovered it. The tube contains nothing at all, even the air has been pumped out. You can't see the X-ray, but it does the most wonderful things! It will go right through some substances—flesh, aluminum, wood and coal for instance—but others, such as glass, most metals and bones stop

it. On a photographic plate it makes a shadow-picture of the things it can't pass through. An X-ray photograph or radiograph of a lady's hand shows the flesh as a light gray shadow. The bones hold the X-ray back so it pictures them as distinct dark shadows. Diamonds and all other forms of carbon (coal is one of them, you know) are as clear to X-rays as glass is to light rays, but gold takes a very black picture, so a radiograph of a diamond ring will show the ring but not the diamond.

How does the X-ray help the doctor? Suppose you go barefooted some summer day and step on a rusty nail which breaks off in your flesh. You wash the cut and bind it up but it swells up and gets "dreadfully" sore. The doctor tells you that a piece of the nail



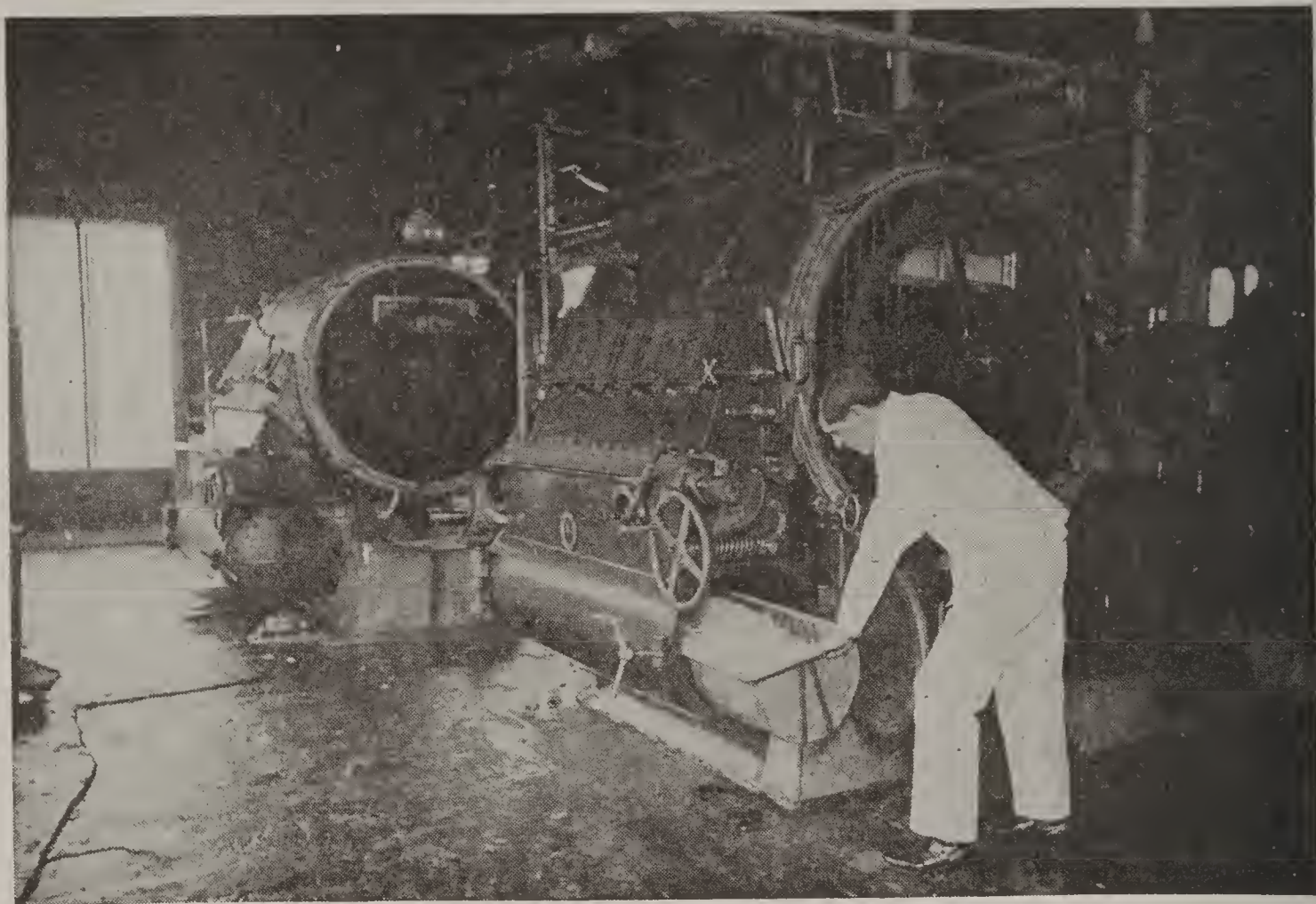
has been left in there and will have to be taken out or you will have lockjaw. Before the X-ray was discovered he would have had to "probe" for it—slash and dig into your foot with his knife until he found the little piece of metal. Now all he does is to take an X-ray picture of the foot and it will tell him just where to find the thing that causes the trouble. If you get glass in your foot he can tell in the same way, for glass "takes" dark in a radiograph. If broken bones have been

set wrong the X-ray will tell the doctor so. By using it they can find out all about a poor little cripple girl's crooked back and give her the kind of treatment she needs. And the ray tells where to find the bullet that has lodged somewhere in the soldier's body. Doctors can even use it to help cure diseases of the internal organs, for the salts of some metals show up so plainly in a radiograph that by having a man take a dose of them they can get an X-ray picture of his stomach.

THE HOW AND WHY OF COMMON THINGS

ASBESTOS

What Is Asbestos?



The Asbestos Crushing Machine

Here is the machine which crushes and "fiberizes" the soft asbestos rock. The asbestos comes out, not as a powder, but in threadlike fibres that can be woven into a sort of cloth. The workman in the picture is taking out a binful of the crushed mineral.

HAVE you a gas grate, where the fire plays over a feathery gray screen that glows with the heat but never burns? Or does your mama use papery looking mats under cooking vessels to keep food from burning? The screen and mats are made of asbestos, a fibrous mineral. A mixture of silica or glass, magnesia, lime and iron rust, asbestos is found in mines, in compact masses of long flax-like fibres. These are easily pulled apart, combed

*Asbestos
in the
Kitchen*

into mineral wool, woven into cloth and pressed into light, strong, fireproof boards. Usually a grayish white in color, it is sometimes called rock cotton. It is so light that it floats on water. It is used to make helmets and clothing for firemen, to incase steam and hot-air furnace pipes, to fireproof bank vaults and safes, where money and valuable papers are stored, and for drop curtains for theaters, to keep from spreading. The most productive asbestos mines are in Canada.

THE HOW AND WHY OF COMMON THINGS THE "MOVIES"

What Makes the "Movies" Move?



When running, a rabbit makes his front tracks with his hind feet. This shows the successive positions on "movie" films. When these are run rapidly through the machine, you can see him fairly fly over the ground.

POOR little boys and girls of yesterday! They could never know that thrilly jump that comes when the lion almost eats up the man in the jungle or the brave hero comes in just in the nick of time to save the beautiful lady from a horrible death, for they could never look forward for a whole week to a Saturday afternoon treat at the movies.

Did you know that a long list of distinguished scientists and inventors worked hard for years and years to give you this hour and a half's pleasure all for a nickel or a dime? Some were English, some French, and one was our own great Edison.

This is how it is done. Just imagine a man with a camera is taking pictures of a children's party. He will take them at the rate of twenty-five a second by turning a little crank on the camera. The pictures are one inch wide and three-fourths of an inch high and the film on which they are taken is a long strip of thin celluloid slightly wider than the picture. As the

*How Movie
Pictures
Are Made*

film unwinds inside the camera, a shutter automatically shuts off the light after each exposure is made so that the film can move in darkness the three-quarters of an inch necessary before the next picture is taken. Otherwise the pictures would overlap and blur.

Making the Movies "Talk Straight"

But here's a queer thing. The light spots on the film of a photograph print as dark places in the finished picture and the dark spots as the light ones. In throwing the pictures upon the screen the light must shine *through* the film. But if the powerful light of the moving picture machine in the theater were allowed to shine through the film actually used to photograph the party, we should see a very queer movie indeed. The ice cream and cake, the dishes and the people's faces would all be black; shoes, boys' dark suits and shadows would be white. To make the image on the screen look like the thing it represents, the picture on the original film has to be trans-

*When
White is
Black*

the theater were allowed to shine through the film actually used to photograph the party, we should see a very queer movie indeed. The ice cream and cake, the dishes and the people's faces would all be black; shoes, boys' dark suits and shadows would be white. To make the image on the screen look like the thing it represents, the picture on the original film has to be trans-

ferred to another film. This is done by running the film with the picture on it, together with a new film through a little machine which exposes the fresh film to an electric

light shining through the used film. In this way the dark parts of the used film which present light things in our world, are photographed as light spots on the new film.

*Suppose the little cowslip
Should hang its golden cup;
And say, "I'm such a tiny flower,
I'd better not grow up!"
How many a weary traveller
Would miss its fragrant smell!
How many a little child would grieve
To lose it from the dell!*

*Suppose the glistening dew-drop
Upon the grass should say,
"What can a little dew-drop do?
I'd better roll away!"
The blade on which it rested,
Before the day was done,
Without a drop to moisten it
Would wither in the sun!*

*How many deeds of kindness
A little child can do,
Although it has but little strength
And little wisdom too!
It wants a loving spirit
Much more than strength to prove
How many things a child can do
For others by its love.*

ANONYMOUS

THE HOW AND WHY OF COMMON THINGS

ROPE MAKING

The "Yarn" the Rope Tells



Rope on the Farm

Did you ever make rope like this—by twisting tough, brittle wisps of hay together? This is just the way in which rope and twine are made by machinery.

YOU know that the best way to find out how a thing is made is to un-make it. It is not good for a watch to be taken apart, but rope is cheap. A twenty-five cent clothes line, cut into short pieces, would furnish an object lesson for a whole school.

The strands should be untwisted and counted. There are usually three. Each of these will be found to be made up of several

strands twisted together. One can be separated into threads or yarns, and the yarns pulled apart into short fibres. It is easy to tell if it is cotton. Strong, yellow ropes are of hemp or manila.

In rope making the vegetable fibres are combed straight and split, if too coarse. Then they are spun into yarn as if intended for weaving. There are ingenious ma-

*Taking
the Rope
Apart*

A Plant That Gives Us Rope

chines for spinning and twisting ropes, but a great deal is still made in the old "rope walk." In this the spinning wheels are arranged in a covered walk a thousand or more feet long. The workmen with bundles of combed fibres walk from one end of the building to the other feeding the wheels and spinning the yarn. For ship ropes the yarn is tarred to waterproof it. The yarns are wound on bobbins and set into frames. Then it is just a continuous process of building up the rope by twistings.

How strong a slender rope is, or even a cord or twine. If it were not it could not bear weights and strains, and many people would lose their lives. Yet, when you pull a rope to pieces you can see that it is made up of short, weak fibres. For ship cables and elevators rope made of iron wire is now used. The twisting is done in the same way as when the rope is made of vegetable fibres.

The "Rights" and "Lefts" in Rope Making

But these twistings are "rights" and "lefts," so to speak. They turn in opposite directions so that if one strand wants to untwist, the other strand won't let it.

The A B C's of a rope run like this: A rope is made of strands and the strands are made of threads of yarns. Three strands are twisted into a "hawser" and three hawsers make what is called "cable rope."



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This is a field of hennequin or sisal hemp, one of the fibres from which rope is made. Large crops of it are grown in Mexico and Florida.

For fish lines and fish nets the cord is twisted very hard. This makes it not only stronger but helps to keep out the water.

How and Why They Comb the Rope's Hair

When the fibre out of which the rope is made comes from the bale, it is tangled up a good deal like a little girl's hair in the morning. So, of course, it has to be combed. The machine that does the combing is called the "breaker," because it breaks up the tangles. In our picture of the breaker you can see the combs very plainly. They are arrangements of bars set with pins and run on an endless chain. There are two sets of these combs, one of which runs a good deal faster than the other. The fibre is fed in at one end

*Like Mother
When You
Say "Ouch!"*

ROPE MAKING

In a Grove of Manila Hemp



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These two Filipinos are cutting down the thick-stemmed Manila hemp plants in the first picture, and stripping it, layer by layer, in the second one. Notice the big, palm-like leaves of the hemp—like those of its near relation, the banana. Manila hemp makes the best rope on the market.

of the machine and pulled through by those corrugated rollers, much as a wringer pulls clothes. You notice that part of the combs hang down because of the slack in the chain that carries them. This is done so that if they should reach a particularly hard snarl, the slack will be taken

up and so relieve the pull and give the comb more time to do its work. It is much as when Mother strikes a particularly mixed up place in your hair and you say "ouch!" and she goes a little slower. You notice, too, that three of the link belts shown in the picture hang loose also. This is

Making the Stalks Into Fibres



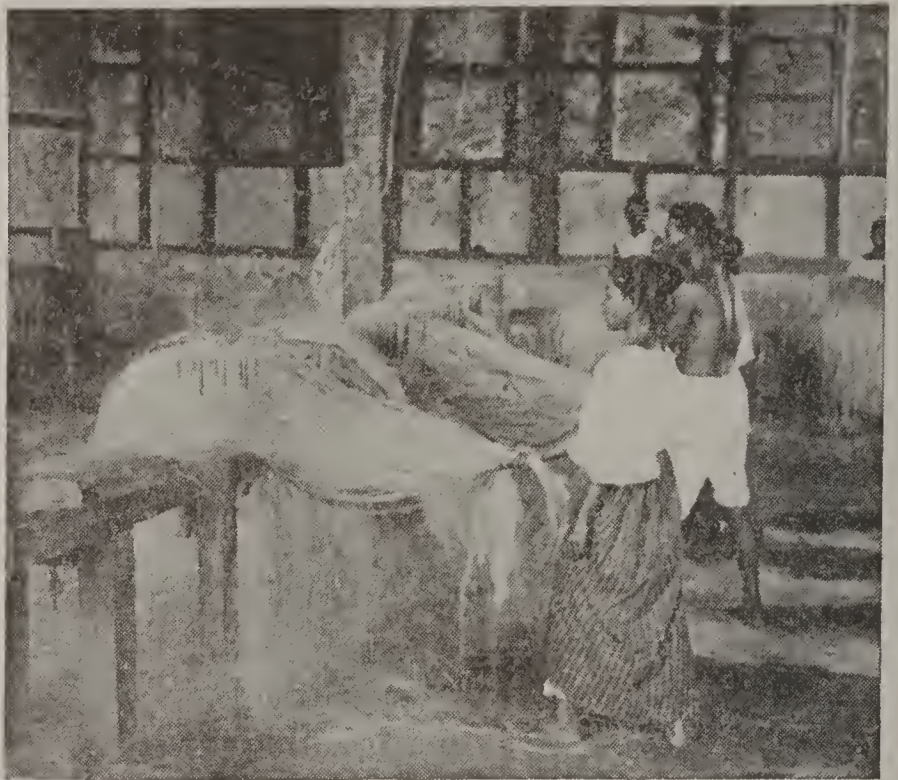
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This is the crude, native Filipino way of reducing the layers of stalk to fibres. The fresh strips of the hemp plant are drawn between a block of wood and a knife blade until the fleshy part of the plant is scraped away, leaving the tough, stringy fibres. These are hung out in the sun to dry as you see in the second picture.

"Hackling" Manila Fibre

"Hackling" is the process of combing the fibres out. The hackling board is a sloping piece of wood with sharp, projecting pegs. The dried fibre is thrown over and drawn through these until it is smooth.

to save friction. Where smooth belts are used they fit tightly on the wheel, but in the case of link belts this is not necessary because the teeth on the wheel keep the belt from slipping. You have a similar chain and sprocket wheel arrangement on your bicycle; unless, of course, it's



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The Rope Walk

The Filipinos are spinning rope in a "rope walk." Each one winds a bunch of the fibres around his waist and throws a few of the fibres over a hook. The hook is kept revolving by a wheel, which is turned by hand. The spinner—that is, the workman holding the fibre—walks backward letting out the strands of hemp as he goes. In this way they are twisted into strands.

selves a straw rope with which they bind their trousers close to their ankles so that the sharp stubble will not cut them. Boys make such ropes just to be "doing."

a chainless.

After the fibre gets its hair combed, it is taken to the spinner, which spins it into yarn very much as you twist a rope out of a stack of straw or hay. Where men in the harvest field follow a reaper they often make for them-

Little Girls Help, Too

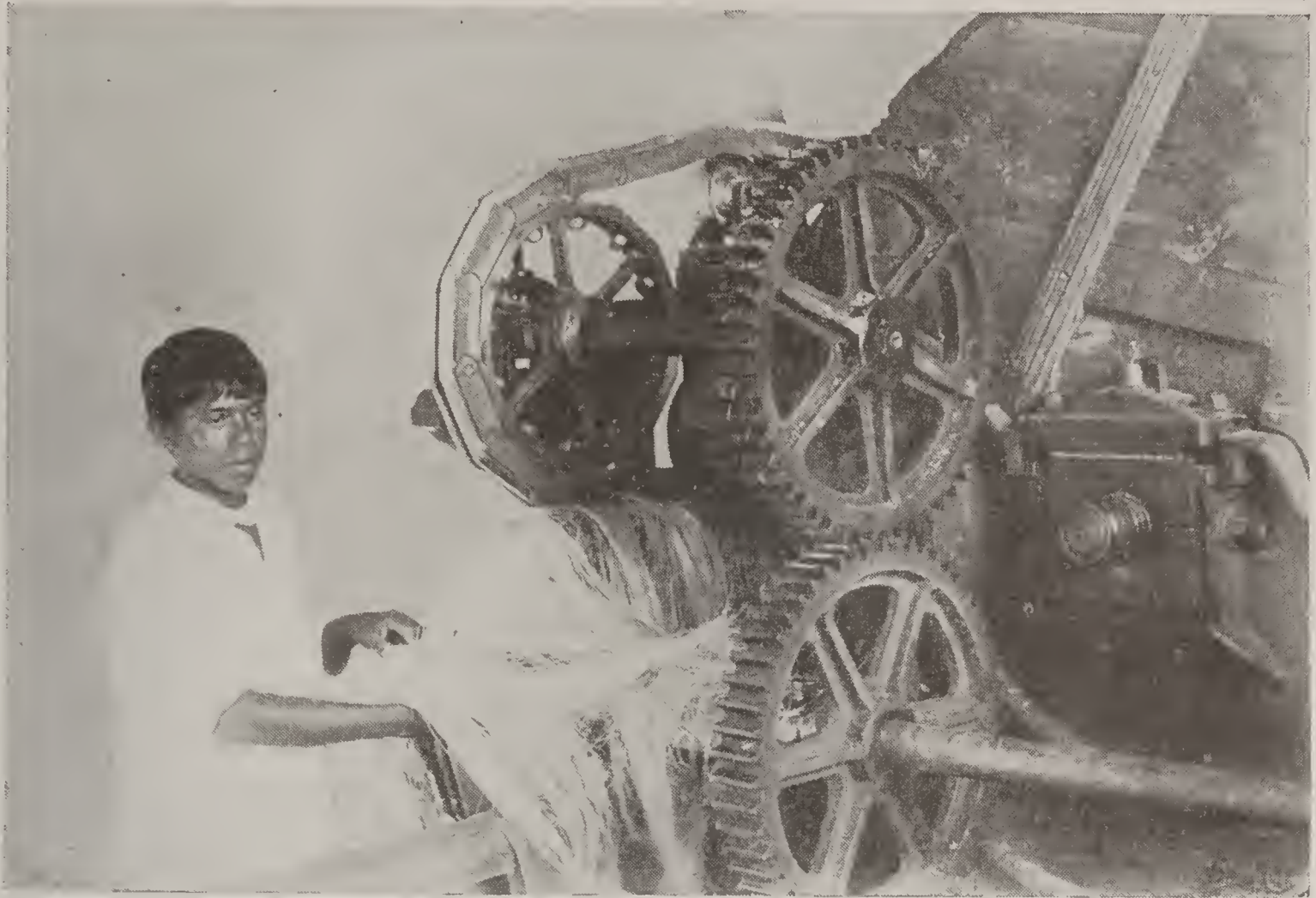
While the little Filipino girl's father and big brother and often mother, too, are away working in the hemp groves or the rope factory, she winds the finished twine on spindles. Notice the house she lives in and the platform or porch she is sitting on—all made of bamboo.



© Keystone View Co.

ROPE MAKING

Fibre Coming from the Decorticator



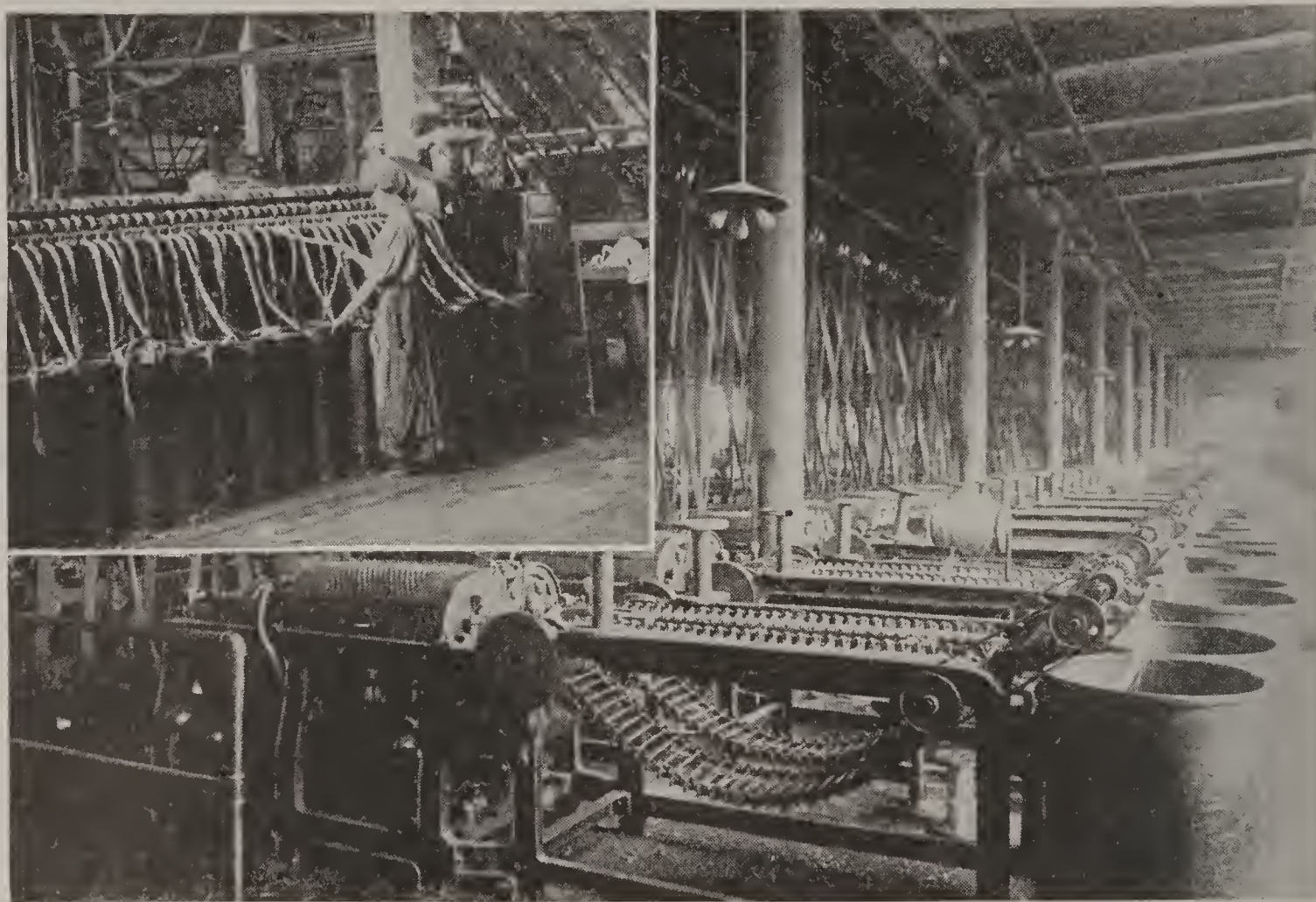
The decorticator is a machine for doing what is being done by hand in one of the preceding pictures. It changes the strips of hemp stalk to fibre. Here you see the hemp coming out of the machine as fibre.

Going Through the "Spreading" Machine



These big piles of fibre are starting through the spreading machine which hackles them in much less time than when it is done by hand as we saw the Filipino girls doing it. The fibres will come out in a broad ribbon, called a "sliver."

Spinning Rope



In modern factories rope is spun like thread. The cans at the end of the spinning machines are called "sliver cans" and from them the fibre "slivers" are fed into the "jenny," which winds it on the horizontal bobbins you see at intervals down the row.

And Last of All, the Twisting

After the fibre has thus been spun into yarn, the yarn is taken to a machine that looks something like a combination of the cogged wheels of a watch and the tops of pepper boxes. This is called a "forming" machine because it forms the yarn into strands. The yarns for each strand are passed through the holes in those "pepper box" tops and then on through the little tube that you see just behind. Then the twisting begins. The wheels turn at the rate of 1,500 revolutions per minute and twist the yarn into cord and wind it up into balls.

The rope-making machine which is next shown, operates on the same principle. Here, however, you do not see any perforated plates. Four bobbins are placed on each of the

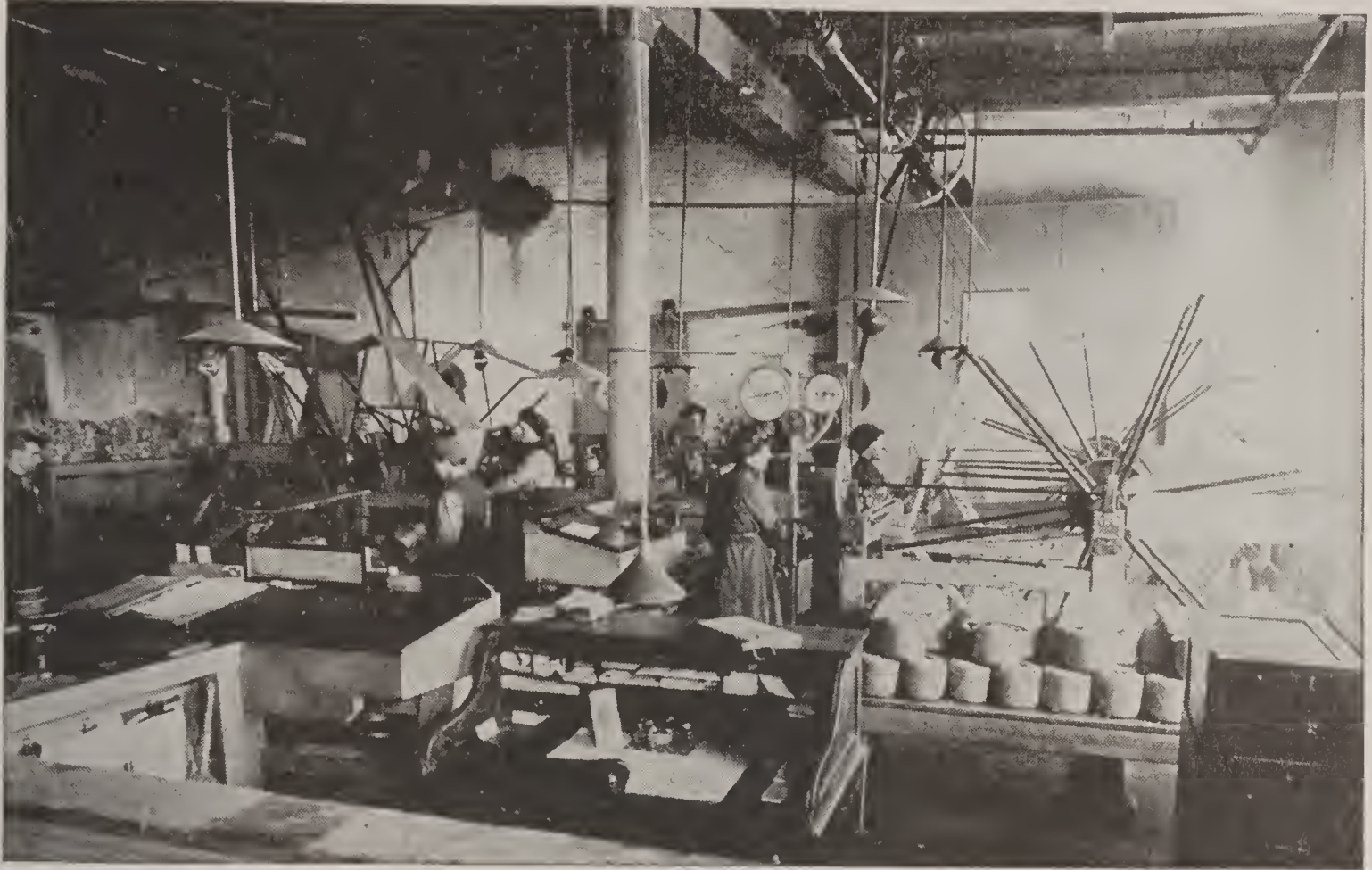
four rods that you see in the frame at the top. These frames are called "creels" or "strand flyers." There are three of these creels so that this machine makes a twelve-stranded rope. Each of these creels as it whirls, twists the strands. At the same time the whole frame containing these flyers whirls also; so that each of the four strands is twisted into a larger strand and these three larger strands twisted together, thus forming the rope. As fast as the rope is made it is wound on one of those big wooden spindles. You have often seen such spools of rope when visiting the hardware store, haven't you?

Like the Whirl of the Planets

This twisting and retwisting, whirl within whirl—doesn't it remind you of the motion of the earth on its axis and in its orbit?

ROPE MAKING

M a k i n g T w i n e



This is the machinery for making twine. It winds the twine on bobbins like the one held by the boy with the cap on. These are sent to the balling room shown in the picture below. Here the twine is unwound from the bobbins into big balls, some of which are to be seen in both pictures. Before leaving this room the balls are weighed and inspected, then packed for the market.

The Machine That "Walks" the Rope Walk

But the most curious thing of all we have yet to tell; that is, how ma-

chinery is made to "walk" up and down a rope walk. As we said in the beginning of the story, a good deal of rope is still made in the old

Testing Rope



This machine tests the finished rope to see how great a strain it will bear and how heavy a weight it will hold.

rope walks, where the men do the walking, but in the most highly developed rope factories they have machines that move down a long track, twisting the strands from the bobbins as they move. A man follows each machine and swings the rope out of the way as fast as it is made, stakes being placed at intervals for the purpose. As soon as the rope

which it has just made is out of the way, back comes the machine again, marching down the track as important as you please! It is said that nowhere else in modern machinery do we find, to the same extent, a machine replacing a man by doing what he did and in the same way.

But all machines are wonderful things, aren't they?

THE PICTURED KNOWLEDGE PLAN BOOK

A PRACTICAL GUIDE
FOR DAILY USE
IN HOME AND SCHOOL



*Arranged in accordance with the
official Study Courses of all our
State Educational Departments,
to show you and your child how
to use the material in Pictured
Knowledge and how to apply it
month by month to the child's
work throughout the year*



ADAPTED AND COMPILED BY
FRANCIS BLAKE ATKINSON

How Can I Help My Child?

The Mother's Question Answered

EVERY mother is interested in the education of her child—she knows that education is not and cannot be finished in the school. It is only begun. Unless there is sympathy, and not only sympathy but co-operation of the most intelligent character by the mother in the home, the school work is dry and uninteresting, and largely fails of its purpose. That is why our great men are “self-made.” Self-made means “home-educated.”

All mothers have the will to help, but not all know the way. They either have not the right material, or, having good material, do not know how to use it. Every page of PICTURED KNOWLEDGE, with its “catchy” headings and sub-headings, and “talking pictures” was written and illustrated to supply just the needed material in the most practical and attractive form, and THE PICTURED KNOWLEDGE PLAN BOOK shows how to use this material to the very best advantage. Not only that, but it is an equally valuable guide as to the proper time and way in which to use the material in any other books in the home library that have any bearing upon school work. To mention a few of its valuable features:

It is Adapted to All Schools

Being based upon a thorough and systematic digest of all our official courses of study and school programs, it may be relied upon in every particular as a daily help and direction of the mother's efforts in connection with the school work of every state.

Always Interesting Because Timely

The children and the bees have always known that the study of flowers is most interesting when the flowers are in the fields, but it took the educators many years to hit upon this idea and apply it to school studies. At last, however, in the official courses of every state and city you will see this element of timeliness made prominent.

Always Fits the Daily Lessons

For the same reason—because the Question Outlines of THE PLAN BOOK follow the school course—the pupil can always be sure of getting hold of the right thing at the right time, the very information called for in his daily lessons.

Makes “Examination Day” Attractive

Most children dread examination day, but THE PLAN BOOK questions are friendly, sympathetic, often “jolly” questions; many of them just the kind of conundrums one boy or girl might ask another under a shady tree on a long afternoon in summer vacation time: “Why are shiny shoes like the moon?” 296.

In short, we feel that this department of PICTURED KNOWLEDGE is one of the most important of the whole work. It will be found equally interesting and useful to parent, teacher and pupil.

Appeals to the Child's Sense of Humor

Education should not be the solemn, dreadful business it is to many children, and as dry as dust to most. It should be as delightful and often as “jolly” as table talk at “Uncle John's.” “Why does a comet switch its tail?” 300

Develops the Child's Imagination

Questions and suggestions like these develop a child's imagination: “Imagine you have been visiting a sugar plantation and describe what the field looks like; the big white house, the negro cabins, and everything.” 529.

Develops Character Through Ideals

The development of character—one of the most important things in education—is best accomplished, not by mere *preaching*, but by *teaching*; teaching by example. “What kind of a boy was Franklin and how did he turn over a new leaf?” 1534. “What was Lee's attitude toward a man's duty in life and what did he say to his son?” 1666.

Creates Ambition and Initiative

A boy's success in life depends upon two things: his attitude toward his school and later, when he begins to earn his living, toward his job: “What relation has a young man's first job to his success in life?” 1229.

Francis B. Atkinson

Birth of the New Year

Wouldn't it seem funny to celebrate New Year's Day on June 21st? The Greeks used to do that. Turn to the picture illustrating how the sun and the revolutions of the earth give us our seasons, and you will see why. 296.

Suppose you were telling a little Greek boy of the old days the different things people do to celebrate New Year's, what would you say? 975.

Why is it that people make merry on New Year's Day? Is it because another year has gone? 976.

What old gentleman is the symbol of the old year and what is the meaning of his hour-glass? 976.

How is the New Year represented? 976.

How did they celebrate New Year's in the days of Julius Caesar? 976.

It was Julius Caesar who "moved up" the Roman New Year's Day from December 21st to January 1st. The reason for counting the beginning of a year from December 21st, you can also

see in the picture of the lamp (representing the sun and the little globes). 296.

How did the Anglo Saxons celebrate New Year's? 976.

What was the Was-sail Bowl? 976.



What does the article say about gift making? 976.

In France, presents are given on New Year's Day just as we give them at Christmas time and the same is true in Scotland where New Year's Day is fully as popular as Christmas. The Persians celebrated the beginning of

their year by giving each other eggs. The Druids distributed branches of the sacred mistletoe.

Why has the custom of making New Year's gifts declined? 976.

Why do people send cards on New Year's Day? 976.

In England, before William the Conqueror the 25th of December was New Year's Day. He changed it to January 1st.

So you see, New Year's Day has jumped back and

forth on the calendar several times.

Why is it that New Year's Day is celebrated with flowers in Southern California? 134.

Why is it that the Northern Pacific



States, although some of them extend farther north than New England, have so much warmer climate? 134.

What makes the Japanese current so warm? 134.

And the Gulf Stream? 134.

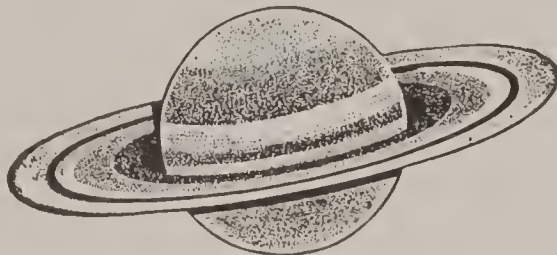
Why is it that the New Year

comes in the midst of the rainy season on the Pacific Coast? 134.

Why is it that they have little rain in Southern California? 134.

Why is Southern California (where this flowery New Year celebration is going on) a land of orange groves, in spite of lack of rain? 134.

The Very First January First



How the Earth and Its Brother Worlds Began to Be

It would look strange to see a big burning coal change into a big round world with cool waters and pleasant fields and woods all over it, wouldn't it?

And yet according to one theory of the origin of the earth and its sister worlds, that is what happened.

What does the story of "Our Neighbors in the Sky" say about this? 303.

Make a little picture of the "world stuff" out of which the planets came. Reproduce the picture by drawing circles with your compass on white paper and smudging the space within the circles with charcoal, and then pick out the white spots with art rubber. It can be done still more easily with chalk on a blackboard or with a slate pencil on a slate. 302.

Why, according to this theory, has the sky in the course of the ages, shown many planets with rings around them like Saturn? 303.

What became of these rings? 303.

How does the "explosion theory" of the origin of the planets compare with this ring theory? 303.

What about the idea that the sun captured its planets and the planets captured its moons by their pulling power? 313.

What is there about a shooting star to remind you of this theory of the captured planets and the captured moons? What is a telescope? 303.

How do they know what a star is made of? 303.

Why are those whirling masses of fire mist so interesting to the man with the big spy glass? 304.

How does old Father Sun help us make our seasons? Show by a diagram in your little notebook how this is shown. 296 and 303.

What is a comet? 300.

Where does it get its tail? 300.

Why does the comet switch its tail? 300.



January Lessons from Uncle Sam

What is the beautiful building that stands at the head of our article on "How Uncle Sam Makes Money"? 1789.

Why is it necessary that he should make money? 1789.

How do you help support Uncle Sam when you mail a letter? 1789.

What are the men doing with those boxes of things, and what are "duties" in this connection? 1790.

How do you help to put money into Uncle Sam's cash box when you buy a pair of rubbers, or mother when she drinks a cup of coffee, or father when he buys a watch (if it is an imported watch)? 1790.

What are those green stamps for on a box of cigars? 1790.

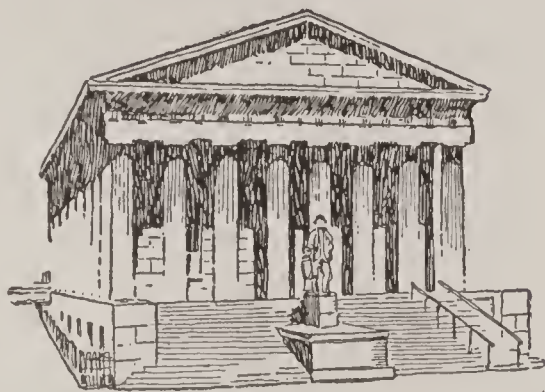
How does Uncle Sam make money out of land he owns? How does he make money out of water, and how does he get it out of the woods? 1790.

How does he get money out of the Panama Canal. 1790.

What was it necessary to do before he could legally ask people to give part of their incomes to him? 1790.

Can you tell some of the ways in which Uncle Sam spends his money? In what way does he put money into rivers and harbors? 1791.

What is a Government Bond, and why do these bonds draw such a low interest? Why is it that, although



he has printing presses to make plenty of paper money, he must still ask us to give him so much? What is the difference between paper money and real money? 1791.

What is inside of the stack of sacks shown in our illustration? 1791.

Why is it that the factory which makes paper money for Uncle Sam is not allowed to make this kind of paper for anybody else? 1792.

How do the owners of gold and silver mines get their product converted into money? 1792.

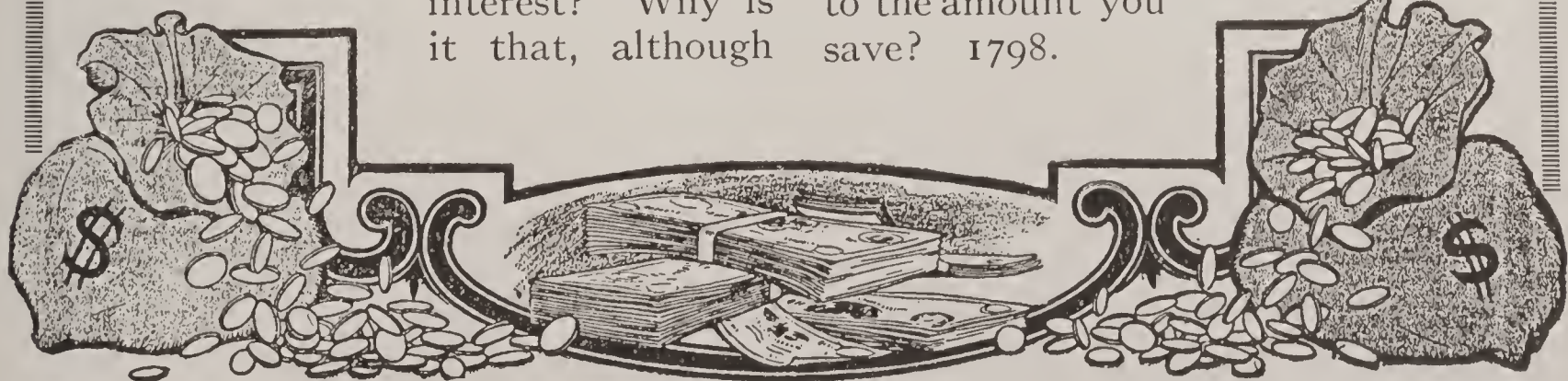
How are the silver and gold bars made into gold and silver coin? 1792.

How can you tell a counterfeit coin from a good one; or counterfeit paper money from good paper money? Why do they have a laundry in the paper money department of the Government? 1792.

Have you any money in the Postal Savings Bank? Tell us how Uncle Sam's Postal Savings Banks help you save money? 1798.

Why have the Postal Savings Banks proved so useful, although we already have so many private banks? 1797.

What is the advantage of having Uncle Sam put your money into his strong box in addition to the amount you save? 1798.





The Genii of the Lamp



The Oil Industry

How did Lincoln manage to read and study at night without an oil lamp? 645.

What's that noise? — clink, clank! clink, clank! 645.

What is kerosene oil supposed to be made of? 645.

What had the ancient monsters to do with the making of it? 646.

Why, although the oil has been in the earth so long, hasn't it all oozed out? 646.

How did men first come to discover that there was oil among the rocks? Find Oil City on your geography map of Pennsylvania, and then imagine how it must have looked in the early days of the oil industry. 646-647.

How do they get the oil; tell about the derrick and the iron cylinders and other things. 646.

What is the difference between a duster and a gusher? 647.

Is the oil all ready to burn as it comes out of the ground? 648.

How do they use pipes in sending the oil to market? 648.

What are the pumping stations for such as you see represented on page 648?

How do they keep the pipes clean? 648.

What is a tank farm? 650.

What is the relation between a can of kerosene oil and the asphalt



pavement that you may cross in going for it to the grocery store? 650.

What is there going on in the kitchen about tea time that suggests the method of extracting the various petroleum products—kerosene, gasoline, naphtha, machine oil and so on? 650-651.

What is it they make from oil that is very useful about fruit canning time; and what do they make in the extraction of kerosene that helps give us electric lights on the streets? 652.

After you have studied the original carefully, take an outline map of the United States—or make one—show where the oil regions are located and write the name of each oil state across it. 654.

How many things do you get from petroleum besides light? 652.

What is a "pipe line," in the oil business? 652.

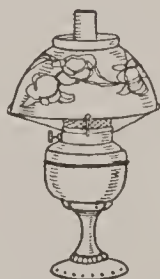
Tell us some other things about "King Kerosene" as a

globe trotter. 652.

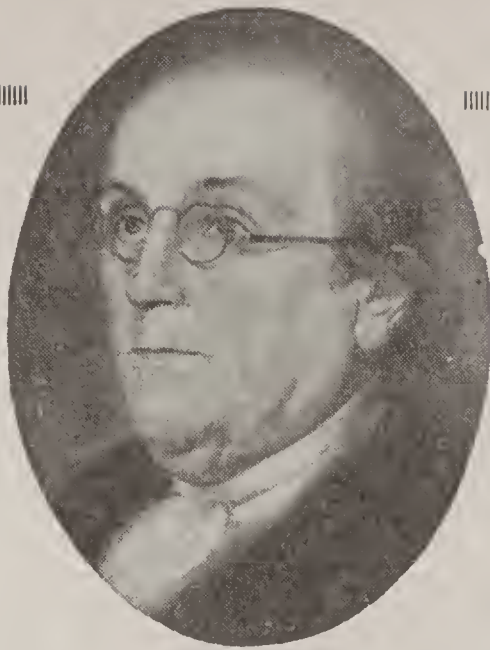
How does the oil get up the rivers into the heart of Africa and other undeveloped regions of the world? 655.

How does it get across the deserts and over the mountains? 655.

How long does an oil well last on the average? 656.



Two January



Famous Men

Benjamin Franklin was born on January 17, 1706, and Robert E. Lee on January 19, 1807. That is why you read and talk about the lives of these two great men in January.

What kind of a boy was Franklin and how did he turn over a new leaf as people are supposed to do on January 1st, when they make New Year resolutions? 1534.

Why, although he was intended for a preacher, did he become a printer? 1534.

Can you tell about some of the things that earned him the name of "The Many-Sided Franklin"? 1534.

Why did he go to London in 1757? 1534.

Why was he so successful in dealing with people? 1534.

What did he have to do with the Declaration of Independence? 1534.

What was the attitude of the French people toward him? 1535.

What was his attitude toward the opinions of other people? 1535.

Why is his biography of particular value to boys who are inclined to be "bumptious"? 1536.

Why, if Jefferson had been living at the time of the Civil War, would he probably have been with Lee on the side of the South? 1666.

Tell about Lee's ancestry. 1666.

Give an idea of how much he sacrificed when he cast in his lot with the South. 1666.

What was his attitude toward the subject of man's duty in life and what did he say to his son? 1666.

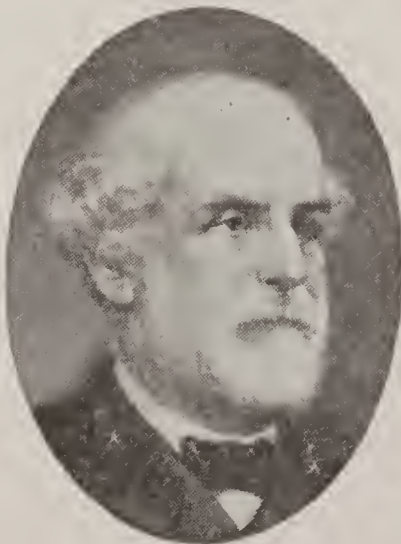
What was the financial result to him of joining the cause of the South? 1667.

What did he do in the course of the war that showed he was such a great general? 1667.

What did he do when foreign Governments gave him opportunities of wealth and high military offices after the war? 1667.

What did his conduct have to do with the making of the "New South"? 1667.

How did the whole Nation show their regard for his character and abilities? 1607-8.



QUESTION
FOR



OUTLINES
FEBRUARY

Washington, His Mother, and His Country

Why was Washington chosen as a leader of the Revolutionary army? 1536.

Did he win many victories? 1536.

In what did Washington's military genius chiefly consist and why should this make him a genius? 1536.

What high tribute was paid to Washington by Frederick the Great? 1536.

What was the chief rule of conduct laid down to her son by his mother? 1536.

Describe Washington as to appearance. 1537.

Tell something about his character. 1537.

Can you give an anecdote to illustrate his modesty? 1537.

How was he respected by other nations? 1540.



What were the difficulties he had to contend with in addition to dealing with the enemy? 1536.

What was his early ambition and what was the first opportunity offered him? 1537.

Why was he unable to accept this opportunity? 1537.

What was the first important duty entrusted to him? 1537.

When called upon to lead the armies of the Revolutionary, what was his financial condition? 1537.

What would have been his reward if the American army had been defeated? 1002.



Name a famous portrait of Washington and by whom was it painted? 1538.

How does Washington's character compare with Napoleon and Caesar? 1539.

How did he differ and what did this difference mean to our country? 1539.

Tell something about the character of his mother. 1004.

Describe her business ability. 1004.

Tell what you can about her appearance. 1005.

What showed her bravery and consideration for others more than anything else? 1006.

Martha Washington and Colonial Social Life

Why was Martha Washington known as "Lady Washington"? 1001.

What is said about her manner in social life? 1001.

What did the word "Lady" mean in Mrs. Washington's day? 1001.

What is said about her and how she bore herself during the trying times of the Revolution? 1002.

What did the Washingtons risk in casting in their lot with the revolutionists? 1002.

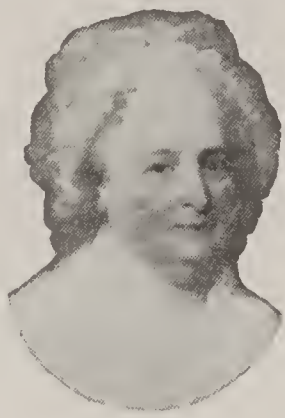
In what way did she aid her husband in the winning of the Revolution? 1002.

How did she help the soldiers to endure the frightful hardships of Valley Forge? 1002.

When was the portrait painted which appears at the head of our biography of Mrs. Washington? 1003.

What was her distinguishing trait in social life? 1003.

Describe the life at Mt. Vernon and



the character of the lives of other Southern planters. 1504.

Why were the people of the Southern colonies more prominent than those of the North in society and politics? 1504.

Where did the children on the great Southern plantations get their schooling? 1504.

Describe the difference between the lives of the people of the South and of the North. 1504.

What is said about the scholarship of the men of the New England colonies? 1506.

How many people were there in the United States in 1760? 1507.

What were the most popular states? 1507.

Tell about the roads and travel. 1507.

And the first newspaper. 1507.

Can you tell who some of the people are at Martha Washington's reception? 1505.



QUESTION FOR

OUTLINES FEBRUARY

Pen and Paper and St. Valentine's Day

Isn't it queer that St. Valentine had nothing to do with St. Valentine's Day? Then why is this day of pretty tokens called by his name? 977.

What has the origin of the day to do with "Nature Study"? 977.

What did the Romans do on February 14th? 977.

What did Mr. Pepys say about little Will Mercer's valentine? 978.

And what beautiful valentine did Mr. Pepys give his wife? 978.

How did the birds help us get the pens for addressing our pretty tokens on St. Valentine's Day? 978.

Why is the pen-knife called a pen-knife? 610.

Where did Lincoln get his pens? 610.

What besides bird's quills have been used for writing? 610.

When were the first steel pens made? 610.

Can you give some idea of the great number of things necessary to be done to make a steel or gold pen? 610.

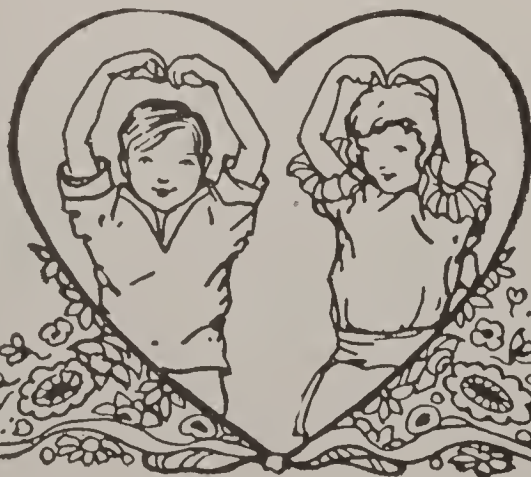
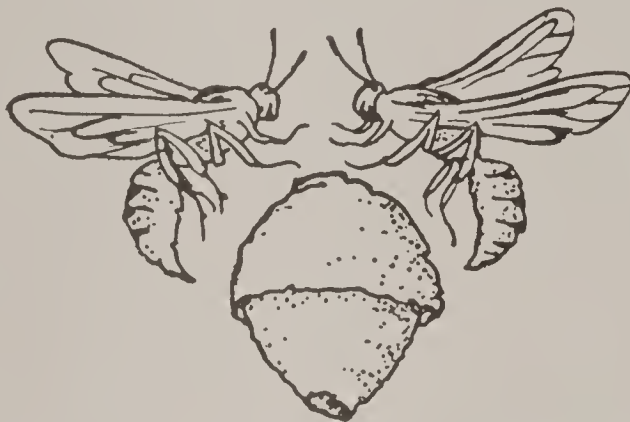
How did the wasps help us get the paper for the printing of valentines and the making of envelopes in which to send them? 1863.

In what way does the paper manufacturer imitate the wasp? 1864.

And what does he do that reminds you of ironing day at home? 1864.

How are trees converted into newspapers? 1864.

Of what use are grindstones in the process of making paper? 1863.



A Great Story Writer

And the Story Hour

One of the most interesting of all the great men whose birthdays come in February, is Charles Dickens; he was born February 7, 1812.

How many of his stories have you read? Have you read any of the stories by Dickens mentioned in our article on the "Children's Library"? 1149.

If you wanted to find some delightfully written books on Nature topics, whose works would you ask for? If you wanted books relating to American citizenship? 1150.

What is a good and easy way to find out about the newly published books that are worth reading? 1150.

What do you know about the great story movement in recent years and what do you think about it? Isn't it a splendid idea? 868.

How do the teachers and story tellers in public libraries learn to tell stories so well? 869.

Why is it that children are so fond of stories of primitive peoples like the Indians? What kind of stories do little baby sister and baby brother like best? 869.

What is the difference between good humor and cruel humor? 870.

Why doesn't the wolf eat Red Riding Hood any more? 871.

What's the good of reading fairy tales? 871. And the Greek myths? 871. What have the myths to do with appreciating the delightfully interesting things in nature? 871.

Where did the Uncle Remus stories come from originally? 871.



How many stories of the Round Table have you read and which ones could you retell? 872.

Why are boys and girls so fond of stories about Knights? 872.

Which one of our girl readers can tell the most about the heroines of history and fiction? 872.

What good wholesome love stories do you know? 872

What is the good of history stories and of animal stories? 873.

Name some writers of animal stories. 874.

Do you know about "Rab and his Friends"? 874.

Give me the names of some good history stories. 874.

Suppose you are looking for some good true stories of explorers, pioneers and heroes of invention and human service, whose lives would you ask for at the public library? 874.

Suppose you are a high school girl and you want to get ready to tell some good stories to your younger brothers and sisters, how would you go about it? How does the story lady do it? 875.

How would you make up a story hour program? 875.

Do you know how the "Little Women" gave plays? 880.

What can the boys do in getting ready for a play besides taking part in it? 881. And the girls? 881.

How can you learn quickly where the best plays for children are to be found? 882.

How can you make plays help you in your history lessons? 883.

Lessons Life of



in the Lincoln

Of course every month is notable for its birthdays of great men, but February is particularly interesting because in this month were born two men who held the highest offices in the gift of their country, and who were two of the noblest men that ever lived—George Washington and Abraham Lincoln.

When and where was Lincoln born? 1640.

What did the home of the Lincolns look like when Lincoln was a baby? 1640.

What did they have for a floor? And what was the door made of? And the bed? What did the family have to eat? What was little Abe's clothing made of? 1640

Why was Lincoln's mother able to begin his teaching and how did she do it? What books did Lincoln have and how did his cousin and his step-mother help him? 1012 and 1640.

In what other ways did he get an education outside of books? Tell how he started out in the world. 1641.

Tell about how he began his practice of the law and how he won his cases. 1642.

How did he become President? 1643-1644.

What was his attitude toward slavery? 1644.

How did Dennis Hanks describe how he received news of the death of Lincoln? 1646.

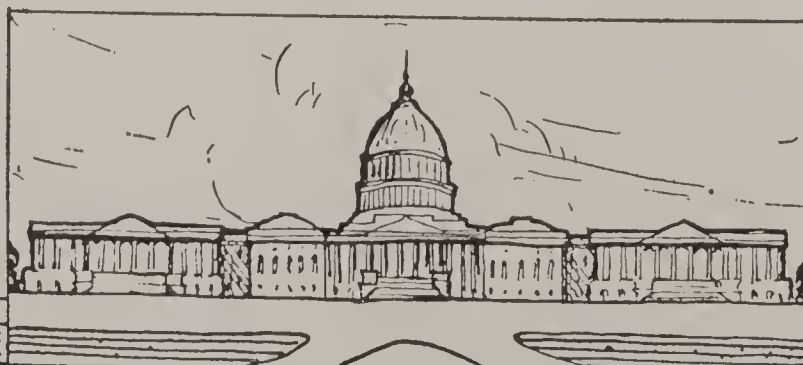
If you were to visit the little cabin in which Lincoln was born, what beautiful building would you see? 1640.

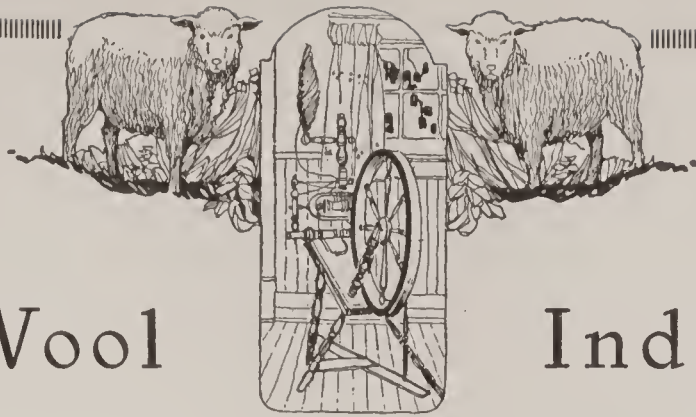
What is the greatest lesson in the life of Lincoln? 1649.

What is said about Lincoln's ambition? 1655.

What was the story of Lincoln and Willie Bladen? 1655.

Can you tell the story of the boy and the lost apple? 1654.





The Wool Industry

The Woolen Industry and woolen things are particularly interesting things to talk about on cold winter days, and for this reason are talked about in school.

Why are so many sheep living on soil that is not good enough for farming? 633.

How would you like to live in a mountain-sheep country? 633-634.

How do the children get their schooling? How do sheep act in a snow storm? 634.

Where do they go for food in summer, and where in winter. 634.

What do the rabbit and kangaroo have to do with sheep farms in Australia? 634.

Do you like Scotch collies? Tell us about them. 634.

How do they find lost lambs? 635.

Why are they like good office boys? 635.

What do the dogs do when the little lambs are born? 635.

How does a sheep furnish his own soap when he gets his bath? 635.

What is said about the factories in which the different kinds of wool are made? 637.



How the French Shepherdess Knits.

How is wool prepared for wearing? 637.

On what part of the sheep is the best wool? 637.

How do they comb the sheep's "hair"? 638.

Why is the wool oiled after being washed? 638.

How do thistles help you get wool clothes? 639.

How do they put the fuzziness on woolen blankets? 639.

How is felt cloth made? 639.

How did they make woolen cloth in Colonial days? 639.

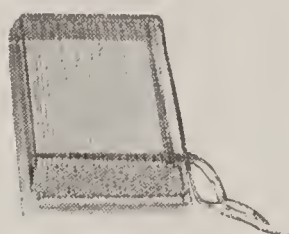
How do you tell whether things are really woolen? 644.

What can you tell by sprinkling samples of cloth with water? 644.

What is the difference between the "feel" of cotton and the "feel" of woolen threads? 644.

And in the ways in which they break? 644.

Which is it has such a bad smell, burnt cotton thread or burnt wool thread? 644.



Can you weave on a loom like this?



Work of the Under



Harvesters the Ground

Let's see how much we can learn about it in Pictured Knowledge. Coal, like wool, is one of the interesting February topics in school.

Can you tell what the forests in the coal age looked like? 613. Why are these lamps covered with wire gauze? 618.

Why are lumps of coal sometimes called "dusky diamonds" or "buried sunshine"? 613.

Why is it that you sometimes find pictures of leaves in pieces of coal? 614.

Tell how the woods or forests were converted into coal. 616.

What is the largest of our coal regions? 616.

Can you name the states in which are coal fields, shown on this map? 616.

How big was the Gulf of Mexico when Nature was putting in our winter coal for us in her great bin? 616.

Why is it that coal is sometimes found near the surface, and sometimes it is necessary to dig deep for it? 616.

Draw lines showing the relative rank of coal producing countries. 616.

What does a coal mine shaft look like? 616.

How do the men, tools, coal cars and mules get up and down the shaft? 616.

What is that queer thing our miner boy wears



Why don't they use locomotives for hauling in mines? 618.

How do they get fresh air into the mines? 618.

How do they reach the coal veins from the shaft, since the shaft is vertical

and the seam horizontal? 619.

How do they keep the roof from falling in? 619.

Wouldn't it be interesting to make a coal mine with mules and carts and everything, just as shown in the picture? Try it. 619.

What is the danger from water in mines? 619.

What is said about the statue "The Miner's Good Bye"? 619.

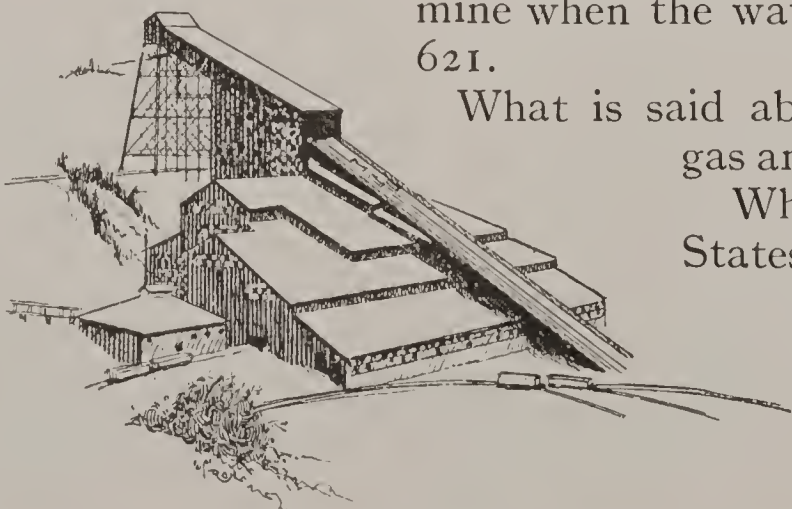
What do they do with fires in mines when they can't put them out? 620.

Tell what happened in the English mine when the water broke through. 621.

What is said about explosions of gas and coal dust? 622.

What has the United States Bureau of Mines done in protecting the lives of miners? 623.

Who are the rescuers? 623.





QUESTION
FOR

OUTLINES
MARCH



The Army and the Navy

Our Navy and Its Work

What is the argument for a large navy and a small army in this country? 929.

Name two ways in which a boy can serve in the United States Navy? 930.

How old must he be. 930.

On what kind of ships does the boy who attends the Naval Academy get his first training? 930.

What has education to do with getting into the Academy. 930.

What does he study when he gets there? 930.

Give some idea of the character of the guns on a modern battleship? 931.

Now turn back to the picture of The Wyoming on page 928 and tell what that great tower is near the center of the picture? 931.

What do the men do in the conning tower and how do they do it? 931.

Where is the powder stored that is used on a battleship? 931.

By what device is the ammunition protected from the danger of the fire necessary

to keep up the steam? 931.

What other kinds of engines besides the one that drives the ship are found on a battleship? 931.

Describe a torpedo boat and how it works. 932.

Tell about the torpedo that is operated by wireless. 932.

How is the food for provisioning a battleship kept from spoiling? 930.

What is the first thing a boy learns when he enters the Navy? 934.

In what way are sailor boys taught to be neat housekeepers? 936.

How do they put coal into a man-of-war? 936.

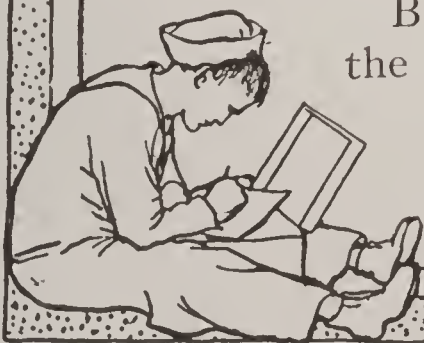
Is it all work and no play for the boys in the Navy? 938.

How do they keep their rowing muscles in good shape when they are not rowing? 938.

How do the duties of the marines differ from those of ordinary sailors? 939.

What are mines used for in naval warfare? 940.

How are hidden mines located and removed? 940.



Our Army and Its Work

In what way do present conditions of warfare differ from those of the Revolutionary period? 1754.

What does General Wood say is the greatest reward for the boy who wants to become one of his country's soldiers? 1752.

What is the motto of the military academy at West Point? 1752.

What high tribute does General Wood pay to the efficiency of the American soldier as proven in peace and war? 1762.

Why, although other nations had them, did not the United States keep a large standing army? 1753.

Why before the World War did we think at first we could win all our wars with volunteer soldiers? 1753.

Why was the volunteer system so efficient in Colonial days? 1754.

How did the training school at West Point come to be established? 1754.

When did we begin to build up a large modern navy? 1756.

What changed conditions in warfare did the great war in Europe suddenly reveal? 1758.

What part did machinery play in the new warfare? 1758.

What did the Paul Reveres of the World War ride on? 1758.

How did the training of the soldiers differ from the training under the old system? 1758.

What is camouflage? 1758.

Did Germany and Austria obey the rules of civilized warfare? 1760.

What did they do in Belgium? 1760.

What did the children of America do for the poor Belgians? 1760.

Why did England come to the defense of Belgium? 1760.

What violations of the rules of civilized warfare did Germany commit in her war on England? 1762.

What was Germany's conduct in her sea warfare toward neutral nations? 1762.

How many non-combatants did she destroy in this war in six months? 1762.

Tell about the sinking of the Lusitania, and how the United States was forced into the war. 1762.

How did the United States attempt to remain out of the war in spite of the sinking of the Lusitania? 1762.

Why, in spite of Germany's agreement to refrain from further acts of piracy, did the United States do a certain amount of preparing for war? 1764.

What did this preparation consist of? 1764.

What was the selective draft? 1768.

What were the Liberty Bonds? 1768.

How did the women and children of America help to win the war? 1762.

How long after the United States entered the war did the American soldiers fight their first battle? 1774.

What is said about the fighting qualities of American soldiers as shown in this war? 1778.

When was the Armistice declared and when was the Treaty of Peace signed? 1778.

What is the League of Nations? 1778.

Mothers and Wives and the Making of Presidents

Who was called the "Portia" of the Revolution? And who gave her the name? 1007.

Who was the original Portia? 1007.

What were the characteristics of Abigail Adams? 1007.

What did John Adams say about the mothers and wives of great men in history? 1007.

How did Abigail Adams get her education, and what do you think of educating yourself in the same way? 1007.

In what way are we all indebted to her for the freedom which America achieved and which we now enjoy? 1008.

What else did Abigail Adams do besides helping her husband in public service? 1008.

What did she say and do with regard to the education of her daughters? 1008.

What was her opinion with regard to women's right to vote? 1008.

Why was she called the feminine Benjamin Franklin? 1008.

How did her son sum up her character? 1008.

Suppose you had known



"Dolly" Madison and were describing qualities to someone who didn't know her, what would you say? 1009.

By the way, why did the familiar and affectionate name "Dolly" seem so appropriate? 1009.

Tell about the romance in her marriage to James Madison. 1010.

What tribute did President Jefferson pay to Mrs. Madison's social qualities? 1010.

How did she show her courage in the War of 1812? 1010.

Tell the story of Nancy Hanks. 1011.

What did her cousin Dennis Hanks say about her? 1011.

How did she educate herself and how did she

educate her son? 1012.

How did the wife of Andrew Johnson help him to get an education and then help him to get to be President? 1013.

How did President Garfield on the day of his inauguration tell the whole nation how much he owed to his mother? 1015.

Tell the story of Eliza Ballou Garfield. 1013.

Michael Angelo Sculptor's



and the Art

Children learn to read the beautiful language of Art as well as the language of Letters, and in March learn something about the life and work of Michael Angelo. Our illustration shows him as a boy carving a statue.

How did the Greeks produce such wonderful works of sculpture? 1903.

How did their early work compare with later productions? 1903.

What rank is accorded the statue known as the Venus of Milo among the productions of the Greeks? 1906.

What is the theory of modern scholars as to who this beautiful lady really is? 1906.

And as to how she came to be buried on the Island of Melos? 1906.

How did the Romans compare with the Greeks in art? 1907.

Who was Auguste Rodin? 1908.

What is his opinion of Michael Angelo? 1908.

The picture at the top of this page is a reproduction of Donatello's Laughing Boy. Compare it with the Bust of a Child, by Canfield. How does Christian compare with Greek Art in its relation to figures of children? 1911.

Who was Sir Henry Vane, the original of this statue by MacMonnies? 1917.



What work of MacMonnies attracted a great deal of attention at the World's Fair in Chicago? 1917.

What circumstances led Saint Gaudens to make a figure of Robert Louis Stevenson? 1919.

Why is he represented on this medallion as writing in bed? What is he writing? 1919.

In connection with the picture of Saint Gaudens at his work, tell how a sculptor works. 1919.

What did Greek art owe to the Egyptians? 1903.

What is there about the statue of Rameses II that curiously illustrates how slow men were to realize that a statue can be made separately from a wall? 1903.

In what way did the Greeks differ from the Egyptians in being bound by tradition in art? 1903.

In what did the Assyrians particularly excel? 1904.

Where is the original of Saint Gaudens' statue of The Puritan? 1916.

Our Pennies and the Copper Industry

March is the beginning of the outdoor season when extra pennies will be needed for marbles and tops, and other early spring things, so that the long and interesting story back of a copper cent will be especially interesting.

Why is copper the "children's money" all over the world? 1363-4.

What was the first of all the metals used and why? 1364.

Why did the use of copper precede the use of iron? 1364.

Name some of the many things you can do in the shaping of copper. 1364.

Is it a good "mixer" (as we say of one who gets on well in society)? 1364.

What is the striking difference between copper rust and iron rust in their effect on the metals? 1364.

Where did copper get its name? 1364.

How is bronze made? 1364.

What was the Bronze Age? 1364.

How many things can you name which were then made of bronze? 1364.

What is bell metal, and where does it get its musical tone? 1364.

Why did the cooks do so much



*"One a penny, two a penny,
Hot cross buns!"*

polishing in the Middle Ages, and why don't we do it now? 1365.

What proportion of the copper of the world comes from the United States? 1365.

Where is the largest field of copper in the world? 1365.

How did the Indians come to discover this copper and how did they use it? 1365-6.

Why is some of the copper found so near the surface in the Michigan mines? 1366.

How do they get to the copper that is far below the surface? 1367.

How do the men get fresh air down there? 1367.

What is the difference between the method of copper mining in Michigan and in Montana? 1368.

How is copper made to smelt itself? 1369.

What can you tell about the use of copper in the electrical industry? 1369.

Work of



the Courts

How may a dispute over marbles be used to illustrate the purpose of our courts? 1786.

What is the purpose of having different grades of courts? 1787.

In what city in every state does the supreme court hold its sittings? 1787.

What kind of cases are taken into the Federal courts? 1787.

Where is the highest court of all located? 1787.

Can a crime be lawfully settled out of court? 1787.

What was the origin of the jury system? 1788.

What is the business of the jury and how does it differ from that of the judge? 1788.

Suppose you lose a case, can you have it tried again? 1788.

Tell the story of the good friend of boys whom the boys themselves christened the "kid" judge. 445.

What the Juvenile court does for the boy. 446.

How did Judge Lindsey handle the case of the boys who robbed the pigeon roost? 445.

What is meant by a parole and how did the parole system work with the boys? 445-447.

What did Judge Lindsey say about the relative value of a live boy and a dead man's millions? 446.

How did Judge Lindsey get to be a judge? 446.

The little girl who is carrying her big baby sister lives in the slums of New York. All great cities have slums, and the boys and girls there have a hard time of it. It is the boys and

girls of this class who most frequently get into the Juvenile courts. Jane Addams has devoted her



life to aiding the people of the slums by living among them.

When did she first think of being a neighbor to the people of the slums? 433.

How did she become interested in the poor immigrants who come to this country? 434.

How did she qualify herself for her great work? 434.

What is Hull House, and what do they do there? 434.

The Laws and Law Making

How does the making of a law frequently start among the people themselves? 1779.

What is meant by the terms "initiative" and "referendum" in the making of laws? 1779.

How may citizens take part in the discussion of a proposed law in a city council? 1780.

When a bill is changed, while under discussion, what is the change called? 1780.

What is the last thing that happens to a bill before it becomes a law? 1780.

What experience does "Bill" have that is like one's first day at school? 1780.

In what way are the different departments of Government like the wheels of a watch? 1781.

If you were mayor, give us some idea of what your duties would be? 1780.

What does the head of the Executive department of the city, state or nation do when he disapproves of a proposed law? 1781.

Can a bill become a law in spite of

the opposition of the executive? 1781.

Do presidents and governors preside over the legislative branch in state and nation? 1782.

How do presidents and state governors let the legislative bodies and the nation know what they think about the need of legislation? 1782.

Can a state legislature or congress pass any bill they please? Could they, for example, pass a law taking away the right of trial by jury? 1784.

We have seen how the executive can act as a check on the legislative body. Now tell how a city council, a state legislature or congress can act as a check on the executive. 1784.

The Public Schools and General Welfare

Under what clause of the Constitution does the Federal Government contribute to the support of our public school system? 1684.

How is this done? 1684.

How has Uncle Sam helped us to get our State Universities? 1684.

And Colleges of agriculture, mining and mechanical engineering? 1684.

What has he done for the education of the Indians and Negroes? 1684.

Why does the Government have education in our Island possessions and other places outside of the United States? 1684.

What are some of the other things Uncle Sam does under the "General Welfare" provision of the Constitution? 1684.

What two classes of immigrants has the Government to deal with; and which of these classes is barred out? 1677.

How does the United States compare with other nations in the rapidity with which it has made Americans out of foreigners? 1677.

What does the Government do in the improvement of our water ways? 1682.

And the building of lighthouses? 1682.

When was the life-saving service established? 1683.

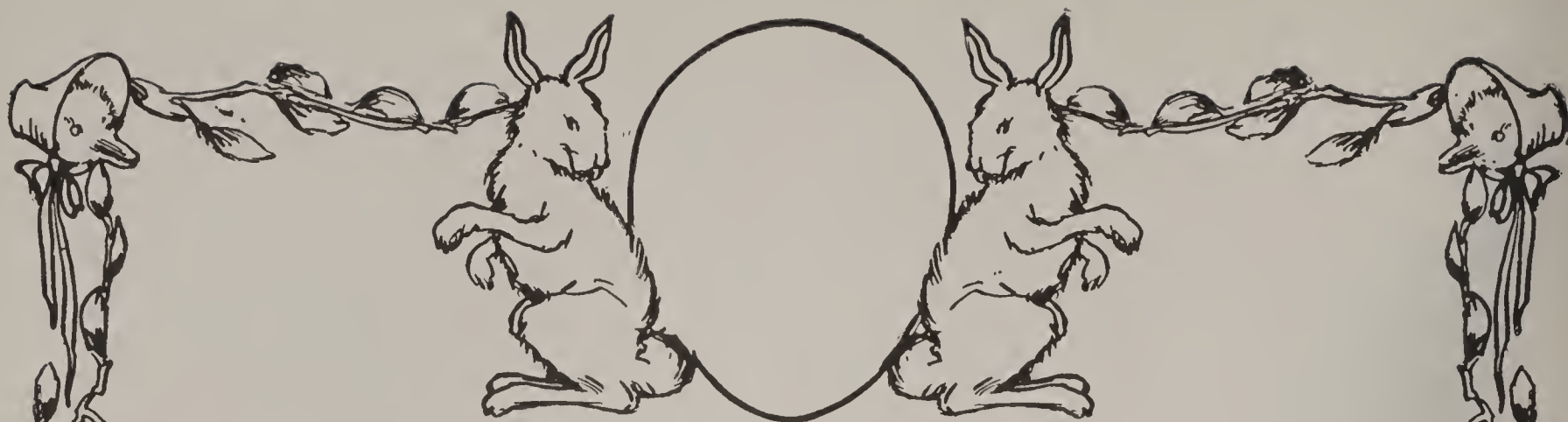
How many life-saving stations are there on our coasts? 1683.

What was the "Homestead Act"? 1685.

Tell how it aided in the rapid settlement of the country? 1685.

In what way were Indian reservations converted into farm lands? 1685-6.

What has the Government done in helping to bring the dry lands of the West under cultivation? 1686.



EASTER

Children are apt to think of Easter simply as a time for coloring eggs. But the celebration of the day really has a very profound meaning. It is not only related to the most sacred meanings of the Christian religion, but to man's attitude toward the wonders of the renewal of life in Nature.

Why do we have an Easter Sunday? 980.

From what does the word Easter come? 980.

How do the Russians greet each other on Easter morning? 980.

Does Easter always come on the same date? 980.

What has the man in the moon to do with the fixing of the date? 980.

Why do the people of some countries refer to Easter as "The Feast of the Flowers"? 981.

Why is the egg a symbol of Easter? 981.

What do the children do in Washington to celebrate Easter? 981.

How did the rabbit get into Easter? And what has his story to do with the man in the moon? 981.

In connection with the celebration of Easter, it will be interesting to make a little study of the masterpieces of art

that are related to the thought underlying Easter Day observances—the life, death, and resurrection of the founder of the Christian religion.

What did DaVinci do with his pen before he began working with his brush on this picture? 1881.

What is said about the Apostle who is about to drink? 1881.

What famous Italian artist painted "St. Christopher and the Christ Child"? 1885.

What was St. Christopher's original name? 1885.

What was he famous for? 1885.

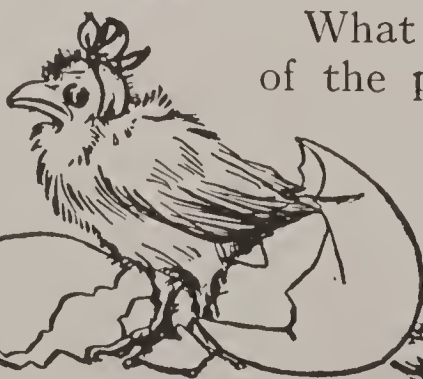
How did he get the name St. Christopher? 1885.

What is the story told in the picture? 1885.

Who painted "The Sistine Madonna"? 1886.

How does it rank among the great paintings of the world? 1886.

What are some merits of the picture? 1886.



What Water Means to the Desert



Where has the "Great American Desert" of the old geographies gone? 126.

Where does the water come from that is used in irrigation? 126.

Why are these dry Western lands so fertile? 127.

Who did the first irrigation work in this country? 127.

Where did Denver and Salt Lake City get the water that helped to make them grow? 127.

Why didn't the farmers themselves irrigate the land in the West? 128.

Where is the Roosevelt Dam? 129.

How large is it? 129.

How many acres of land does it irrigate? 129.

What else does it do besides supplying water for irrigation? 129.

How does water for irrigation purposes cross a valley? 129.

Illustrate the difference in price between irrigated and non-irrigated land? 130.

Why do plants need water? 673.

How does the water supply the plants with nitrogen? 673.

What kind of plants get their nitrogen directly from the air? 673.

Did the Egyptians know anything about irrigation? 682.

How is the water of the irrigation works distributed over the land? 683.

What is dry farming? 683.

What crops are best grown in dry farming and why? 683.

What is meant by summer fallow? 684.

What important grain grows in soil filled with water? 682.

How do they get rid of the surplus water in lands that are too wet. 682.

How does the water of the soil get into the tiles? 682.

April Flowers and The Bees

The Bees and the Blossoms

Where would you look for wind anemones? 346.

What colors are the flowers and how many petals have they? 346.

What other flowers are you likely to find among the anemones? 346.

What does the flower of the spring beauty look like? 346.

What is the color of the stem; and what kind of leaves has it? 346.

What does the spring beauty do when the sun goes down? 346.

And when you wash its face? 346.

Has the Easter lily many relations among the flowers of spring? 346.

To what family does the dog-tooth violet belong? 346.

What is its flower like? 346.

To what family do the wake-robins belong? 346.

How many petals have they? 346.

What does the flower called jack-in-the-pulpit look like? 346.

Describe the flowers of Solomon's seal. 346.

What other name do you know for the "dutchman's breeches" and where did it get its name? 346.

That bee at the top of the page is going marketing. Can you tell about her market basket and how she uses it? 399.

How do the bees get the pollen ready to put in the basket? 399.

When do the bees gather honey, and when do they gather pollen? 399.

How do the bees keep posted on what is going on around them? 400.

What do the bees do when they get to the hive with their market baskets? 400.

What do the nurses feed the baby bees? 401.

What do the nurse bees do when the larvæ stop eating? 401.

How long after the eggs are laid do the little bees hatch out? 401.

What color are the bees when they are first hatched? 401.

How are the little bees fed? 401.

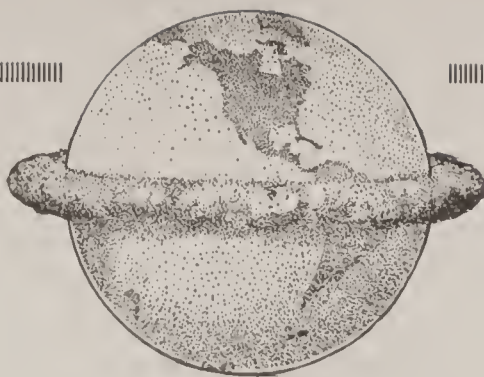
How do the bees keep the air in the hives sweet and fresh? 401.

Why do you hear so much humming in a bee-hive on rainy days? 401.

How do the bees talk to one another in the hive? 405.



April and



the Rains

How is the weather man able to predict rain when the sky is perfectly clear? 315.

What are clouds made of? 317.

What clouds are like Little Bo-Peep's sheep and why? 317.

Why is there a warm, rainy belt along the Pacific coast? 320.

Why don't they get more rain in certain regions east of the Rocky mountains? 320.

Tell how the "high and low" brought rain on a certain day in Chicago. 320.

Why is there a constant belt of clouds around the equator? 321.

Reproduce the rain map of the world and tell about it. 321.

How does a rain gauge count the drops? 315.

How does the sun help to make rain? 313.

What did the old Norse people call "It" that rains? 313.

Tell how the wind waltzes and point out the things in the illustration that show it? 312-313.

Who was it that discovered that the winds are given to waltzing? 313.

How is a coming storm guest made to register before it arrives? 316.

How can you make a rain gauge of your own? 315.



And how could you measure how fast the air is taking up vapor? 315.

Why is warm air polite? 320.

Why is the wind so fickle? 320.

Tell about

the little wooden horse, and why he takes a walk in damp weather? 320.

How did the rain drops dig the Grand Canyon of the Colorado? 190.



Art and Nature in Springtime

It was the scientist Agassiz who said, "The Pencil Is the Best Eye."

Drawing is not only one of the most attractive and clearest forms of expression, but it opens the eyes to things of beauty and interest everywhere, and at this season when the world of outdoors has so much to show us, drawing is particularly interesting.

How should you hold your brush in drawing these grass blades, for example? 711.

In going to the school store or the art store for your drawing outfit, what would you ask for? 711.

Why are grass blades good practice for beginners in brush drawing? 711.

How do you make wide or narrow lines? 711.

What is the first thing you should do before beginning to draw a Nature spray? 711.

The second, third, fourth and fifth? 711.

In what way may the pencil be used to advantage in connection with the brush? 711.

Is it a good idea to attempt to show light and shade at first? 712.

What is meant by accents in a drawing and how do you make them? 713.

What will happen if you get too many accents in your drawing? 713.

What is the advantage of drawing skeleton figures? 713.

What is the difference between the form of young animals and older ones? 714.



Why may a dog be said to be made of cubes? 714.

In what way does the knowledge of the nature and habits of animals help you to draw their pictures? 714.

To what excellent use can kitchen utensils be put besides getting meals; how can they supply food for the mind? 719.

How should kitchen utensils be "posed" for drawing? 719.

What does a circle look like if the edge is turned toward you? 719.

How do the top and bottom of a cylindrical object differ in appearance? 719.

When does a circle look like a straight line? 719.

What is the first sketching of an object for? 719.

Should this sketching be done slowly or should you learn to do it rapidly and at the same time with fair accuracy? 719.

After you have made your sketch what do you do next? 719.

What are some of the important things a box can teach you about drawing? 720.



The Day for

What was the origin of Arbor Day? 983.

Who made the first appeal to the people to plant trees and what led him to do it? 983.

Who started the custom of tree planting by school children? What was his official position and in what state did he live? 983.

In what way is the interest in Arbor Day kept up by State School Boards and by the Agricultural Department in Washington? 983.

Does Arbor Day always come on the same date? 983.

Why do they celebrate Arbor Day in Florida in January and in most of the Middle Northern States in April? 983.

What state has two Arbor Days? 983.

Tell how a tree should be planted as shown in the four illustrations. 983-984.

What is said about a certain city school, and its "Wall of American Poets"? 984.

How much of our country was covered with forests when the white people first came here? 907.

Were the Indians careful or careless about fires in the woods? 907.

Under what circumstances did they sometimes set fire to the woods? 907.

Why did the early settlers cut down the woods so rapidly? 908.



Planting Trees

Tell about the rapid destruction of the forests by the lumbermen. 909.

How much of this was necessary and how much wasted? 909.

How are forest fires started? 910.

Why does the destruction of forests cause floods? 912.

In what way is lumber now saved in the laying of sidewalks, paving of streets, and the construction of buildings and ships? 912.

Tell how the nation and the states began to preserve their forests? 912.

How many acres of woodland does the State of New York own in the Adirondacks and the Catskills? 912.

Why is especial attention being given to the re-forestation of land near the sources of streams? 912.

For what purpose does the Government permit lumber to be cut from its forest preservations? 914.

Tell about the work of the forest officials in a national forest? 914.

What is the work of the forest policemen? 914.

How are the railroads helping to prevent forest fires? 914.

Suppose you owned a forest tract of your own, would the Government help you take care of it? 919.

What do you know about the "dentistry" of trees? 919-920.



Bird Day

Bird Day comes in April, and so the discussion of the life of John Burroughs is particularly appropriate.

Why didn't Burroughs become a rich banker when he had an opportunity? 469-470.

What did he prefer to making money? 469.

What do you suppose the place of his birth had to do with his choice of life? 469.

What were his recreations in boyhood? 470.

What did little John Burroughs and the squirrels and the robins and the wild bees do together? 470.

What did he study besides books? 470.

Whose essay on Nature did he read? Have you read it? 470.

In what famous periodical did his first essay appear? 470.

How did he earn his living at first? 470.

What did he say about planting himself and the vines? 471.

Where did he get a richer harvest than he found in the things that grew out of the ground? 471.

Imagine you have visited Burroughs in his study and then describe it. 471.

What does he say in his letter to our boys and girls about how to become a naturalist? 331-333.

What advantages have boys and girls now who wish to study Nature compared with those Burroughs had when a boy? 331.

What does Mr. Burroughs say about the letters he gets from school children? 332.

What kind of letters from young people does Mr. Burroughs answer? 333.

What does Mr. Burroughs say about what he has got out of life and what Nature Study has meant to him? 334.

Among other things, Mr. Burroughs has written a good deal about squirrels and their habits. What do you know about them?

If you had a pet squirrel, how would you keep him "squirrelsome?" 858.

What does the writer say about giving the squirrel out-doors to play in? 858.

What is said about the squirrel's cage? 858.

What would you use for a bed? 858.

What is the purpose of putting branches in his cage? 858.

Why should the food of the squirrel include nuts and hard shells? 858.

What do they eat besides nuts? 858.

Forefathers' Day

Why is a certain little wooden bridge one of the most celebrated structures in the world? 1726.

Who is represented by the statue at the bottom of the page and what sculptor made it? 1727.

How many minute men fell at the battle of Lexington? 1727.

What did the minute men have to do with the Battle of Bunker Hill? 1727.

Why was the Battle of Bunker Hill so important? 1727.

And how did it help to win the Revolution, although the battle was lost? 1727.

How tall is this monument? 1727.

Who laid the corner stone? 1727.

What great orator delivered the address when the monument was dedicated? 1727.

Where does the building stand in which war was declared on England? 1728.

Where is the building in which our Nation may be said to have been born, and what is it called? 1728.



Imagine that you have been on a visit to Independence Hall and tell us what you saw there. 1728.

What are some of the historic relics to be seen in addition to those connected with the American Revolution? 1728.

What was the wording of the strange prophecy on the old Liberty Bell? 1728.

How did it get the big crack you see in it? 1730.

Who was Nathan Hale? 1547.

What did he look like?

1547.

How old was he when he gave his life for his country? 1547.

Why was it so important that someone should risk his life on the mission which led to Nathan Hale's capture and death? 1547.

What did Washington and the others do when Captain Hale offered himself for this mission? 1547.

Why was he captured although he had successfully escaped with the desired information from the British camp? 1547.

What sculptor created the statue of Hale shown in Pictured Knowledge, and where does the statue stand? 1548.

QUESTION
FOR



OUTLINES
MAY

May Day and the Flowers

How did the Puritans feel about May Day celebrations? 985-986.

And what witty reason did Lowell give for the Puritan neglect of May Day? 985.

With what goddess of Roman Mythology are May Day celebrations associated? 985.

How long did the flower games last in Rome? 985.

Look at the picture of May Day in Greece and tell what you see. 986.

Why was the statue of Pan carried in these processions? 986.

Tell about the celebration of May Day in England. 986.

What would be a nice way to remember your friends on May Day? 986.

What does the buttercup look like and why is it called a "buttercup"? 347.

What tree leaf does its leaf resemble? 347.

What marsh flower is often mistaken for the buttercup? 347.

How will its leaf help you to distinguish the two? 347.

What kind of flowers and leaves has the wild geranium? 347.

How long is the season of the daisy? 347.

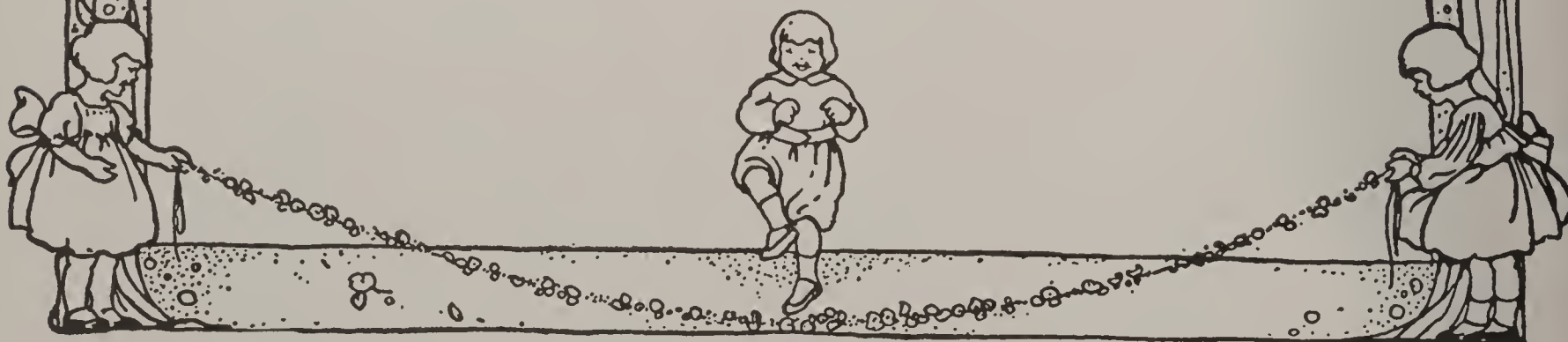
How did Miss Daisy of England get into the fields of America? 347.

Where would you look for forget-me-nots? 347.

To what flower of boggy river banks is the forget-me-not related? 348.

How tall does the purple flag grow? 348.

Where does it get its name? 348.



The Green Fields of May

How do most grasses grow; and what grasses make the best lawns and why? 335.

What is meant by the picture of the little grass elf sowing North America on the globe with grass blades? 335.

Why is there always so much dust flying about in deserts? 335.

In what way does grass act as bed clothes for trees, shrubs and flowers? 335.

What great family do the grasses support? 336.

In what respect are the stems of all grasses alike? 336.

What important product of grass do human beings eat? 336.

Is corn a grass? 336.

And how does grass help mother in making cake? 336.

What peoples build houses and bridges of the big stout stems of certain grass plants? 336.

What other things do they make from bamboo? 336.

How do they make water pails and drinking cups? 336.

We have spoken of the stem; now what is the characteristic of the leaf of all grasses? 336.

What is the drum-stick tree, and



how far would you have to travel from the Pacific Coast to find it? 337.

Why is it that grass blades cut your finger? 338.

What is it that makes wheat straws so smooth and bright? 338.

Do the grasses bear flowers? 338.

In what different ways do grasses carry their flowers? 338.

Give an idea of the size of the blue-grass blossom. 338.

Do you remember the Mother Goose rhyme—

Blow Wind blow; go
Mill go,

That the Miller may have his corn?

In what other way does the wind help us get our daily bread? 338.

How many grains of pollen can the wind find to blow on a single blossom of rye? 338.

How does the corn stalk make it convenient for the wind to help it grow its seed? 338.

How many varieties of grasses have we in this country? 339.

What kind of grass is best to plant in orchards? 339.

What has the story of Persephone to do with grass? 343.



Fishing, Hunting, and other Indian Arts

In what part of the country did the best bow and arrow makers live in the days before the white man came to this country? 1410.

What kind of wood did they use for their bows? 1410.

For the arrows? And what did they use for bow strings? 1410.

How were the arrows straightened? 1410.

Who made the arrow heads? 1410.

What was the difference between the bows of the forest Indians and those of the Prairie? 1410-11.

For what other things was stone used? 1411.

How did the Indians fish in the winter time? 1402.

Tell something about the different styles of architecture in Indian houses? 1411.

Why did the Omahas have skin-covered homes while those of the

South had basket-like walls covered with clay? 1411.

How did the Indians tan their leather? 1413.

What did they make from it? 1413.

How were they able to use baskets to carry water? 1413.

Why didn't the Algonquins and the Iroquois get very far in the development of pottery? 1413-1414.

Who were the Mound Builders? 1414.

What is said of the industries of the Natchez Indians? 1414.

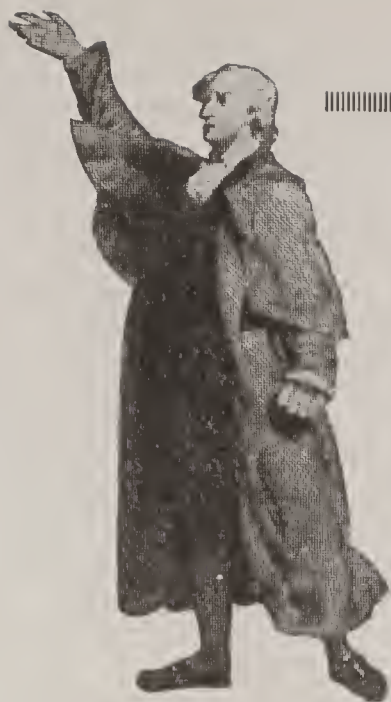
In what part of the American Continent were the most advanced Indians to be found? 1420.

What did the Aztecs and the Mayas accomplish in sculpture and architecture? 1420.

Did the Indians have "pictured knowledge"? 1420.

Did the Mayas have libraries? 1420.

Patrick Henry American



and Oratory

In the timely discussion of the birthdays of great men, in school, children are not allowed to forget that the great orator, Patrick Henry, was born May 29, 1736.

Why may we usually expect to find eminent orators in connection with the great historic events? 1532.

What event of Revolutionary times is connected with Patrick Henry's first speech? 1532.

What did he say in the house of Burgesses that caused the Royalists to cry "treason"? 1533.

What did he reply? 1533.

In what way is his oratory compared with that of Lincoln? 1533.

What part did he take in public life besides making speeches? 1533.

Now while we are on the subject, let us have a little talk on the "Golden Age of American Oratory."

In what way did the memory of Patrick Henry's oratory help to produce more American orators? 1622.

How old was Lincoln when he showed his ability as a public speaker? 1622.

In what way did the newspapers of those days reflect public interest in great speeches? 1622.

What reputation did Calhoun have as a young man at college? 1624.

What attitude did he take on the right of South Carolina to refuse obedience to the tariff law? 1626.

What is said of his attitude toward the Union? 1626.

What is said of John Adams and the Adamses? 1626.

What did he have to do with securing signatures to the Declaration of Independence? 1626.

What can you tell about the beginning of the career of Henry Clay? 1629.

What public offices did Clay fill? 1630.

From what is said of Clay's skill as an orator and his personal charm, can you understand why he was called "The Great Pacificator"? 1632.

What great service did he render both to the North and the South? 1632.

What is said about the childhood of Daniel Webster? 1632.

What did his mother have to do with his early education? 1632.

How did his family manage to send him to college, although they were so poor? 1632.

How did Webster show his gratitude for what his family had done for him? 1634.

Tell about his famous reply to Hayne. 1634.

QUESTION
FOR



OUTLINES
JUNE

The Awakening of the Marshes

Your frog and toad pets ought to be particularly interesting at this time because their relatives in the marshes are now awaking and doing all sorts of interesting things.

How would you make a nice, comfortable home in an aquarium for a toad? 856.

How many inches of gravel would you put into it and why do you build one side higher than the other?

How does the toad take a drink? 857.

Would you put the aquarium in a sunny place or not? 857.

How many times should a toad be fed? 857

How do you get fresh "game" for Mr. Toad and how does he eat it? 857.

Why is it that Mr. Toad can pick up things with his tongue as easily as you can with a fork? 857.

Why is it that a toad looks so much like a clod of earth; what advantage does he gain from it? 857.

Where is the toad's ear? 858.

Did you ever notice how a toad's throat beats as if his "heart had come up into his mouth" as we say? Why is this? 858.

How many toes has he on his feet and how many fingers on his hand? 858.

What does a toad do when you scratch his back with a straw and why does he do it? 858.

What would you add to your moss garden that would make it nice and "homey" for a tree frog? 858.

What are those little round things on the end of his toes? 858.

How do they help him hold on to the trees? 858.

What does this article on Pets say about the tree frog's song, and how his throat looks when he is singing? 858.

Which one of the pictures on this page show him in the act of singing?

The frogs just below are getting ready to leap. The tree frog is a wonderful little acrobat. The next two tree frogs are climbing, but the one in the lower left hand corner is creeping down the tree ready to pounce on a beetle.

Outdoor Games



As the long summer vacation is to begin so soon, it is well to be posted on the different kinds of outdoor games.

What is said about the importance of games? 2051.

Of what benefit is a wholesome interest in outdoor sports? 2052-3.

What is said about the kite that grew into a flying machine? 2053.

What did Lincoln say about the steamboat that illustrates the bad policy of neglecting bodily health and energy? 2053.

Tell about some of the different kinds of walking plays. 2054.

Do you know how to put up a "giant stride"? 2054.

Just imagine you were going to get up a hop-sotch tournament this summer; tell how you would mark off the court and how the game is played. 2055. Do you belong to a "hiking" club; if not, do you know how to get one up? 2056.

What is said about climbing, jumping and diving? 2056.

How many of the running games do you know? 2056.

What distinguished poet, whose boy friends called "Will," probably played Prisoners' Base? 2057.

How was it played? 2057.

What is there about the game that interfered with the proceedings of Parliament? 2057.

How do they play Prisoners' Base in Baltimore? 2060.

To what of the four classes of boys, divided as to weight, do you belong, and do you come up to the standard in athletics? 2062.

What is said about the doctor in connection with athletics? 2062.

What is said about scoring the points? 2063.

If you and some more boys were thinking of getting up a marble tournament, how would you go about it? 2065.

What is said about the value of games in developing social qualities? 2066.

How do they play "long ball"? 2068.

What is said about other modified baseball games to suit conditions? 2068.

How do they play indoor football? 2068.



Whitney Cotton



and the Industry

How was it that England was able to control the cotton industry in the United States for a time, and how did this condition help to bring on the Revolutionary War? 1573.

In what way was the cotton manufacturing industry in the United States begun, and what did the winning of the Revolutionary War have to do with it? 1573.

What condition made it very important that somebody should invent a better way of cleaning cotton than the hand process? 1574.

How did Whitney come to undertake the invention of a machine for this purpose? 1574.

How did Whitney, a Massachusetts Puritan, happen to be in the South? 1574.

How did he show his inventive ability in boyhood on the farm? 1574.

How did he earn his way through college? 1574.

Suppose you were trying to tell someone, who didn't know what a cotton gin is, what it looks like and how it works, as shown in Whitney's simple model, what would you say? 1578.

What was the effect of the invention of the cotton gin on the growth of the South? 1575.

And what did it do for New England? 1575.

Did Whitney himself profit by his invention? 1575.

What other line of manufacture did Whitney engage in? 1575.

What was the motto of his life? 1575.

Did the South do much manufacturing of cotton before the Civil War? 82.

How is it today? 84.

How has the South been helped by the Fall Line? 84.

Redraw the map of the cotton-growing states and write the names on each one of them and indicate the cotton growing sections. 84.

When does cotton picking take place in the South? 84.

How much cotton can an expert pick in one day? Tell how they weigh the cotton in the fields? 83.

What does the cotton buyer hang out for a sign? 84.

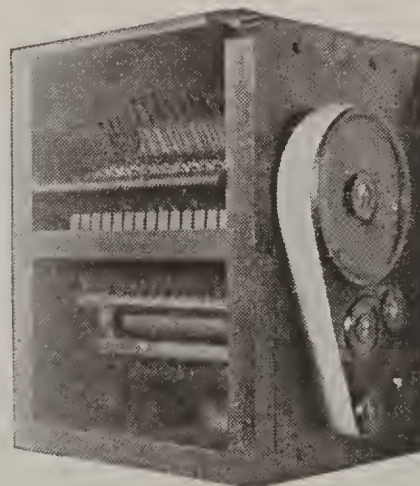
What is the difference between the old style of baling and the new? 84.

What is the advantage of the pressed bale? 84.

How many pressed bales can be loaded in an ordinary box car? 84.

What is the per cent of saving in space? 84.

What is done to cotton in a modern gin besides taking out the seeds? 1577.



The Romance of Silk

You often find a country called "Cathay" referred to in poems and stories and yet we can't find it on the map. Why is this? 1333.

What Chinese town is called "The City of Heaven" in the Chinese legends and stories? 1333.

What was the Queen of Cathay doing on a certain spring morning? 1333.

And what were the little people doing that she was watching among the mulberry leaves? 1333.

Describe how a silk caterpillar spins his silken cradle? 1334.

How are the silk threads made by the worm, and are they threads at first? 1334.

How does the silk worm make twice one equal one? 1334.

In what way does the silk worm act like a shuttle in the loom? 1334.

What does he move himself in this funny way for? 1334.

How does he make a figure 8? 1334.

How can you with you thumb and finger and a piece of thread imitate the work of the silk worm in spinning his cocoon? 1334.

Does the silk worm stop weaving after he has got inside of his new silk dress? 1334.

How long does he do this inside work before he drops asleep? 1334.

What did the queen do for a bell when she wanted to call



her servants? 1334.

How was the silk worm's cradle changed into silk thread? 1334.

How did the queen and her helpers get the threads in the cocoon apart? 1334.

How did the twigs help? 1334.

How did the queen make the silk of one cocoon

"take up" where the other left off? 1334.

How is the silk given its beautiful gloss? 1340.

How did the queen provide occupations for her people? 1335.

What is needle painting? 1335.

Where does silk get its name? 1335.

How did other nations get interested in the silk of China? 1335.

What is the story of the ogress and the Mandarin's daughter? 1335.

What, according to this legend, is the white moth? 1336.

How is the secret of silk weaving said to have spread to India and Persia? 1336.

Where did the Chinese princess who married the Indian prince hide the silk worm's eggs? 1336.

Where did the Persian monks hide them? 1337.

Where does the silk come from that we use today? 1337.

How do they hatch out the silk worm's eggs in China? 1337.

How long does it take the eggs to hatch? 1337.

What do the worms get for their first breakfast? 1337.



Choosing Life Work

What relation has a young man's first job to his success in life? 1229.

Are young people as careful as they should be in choosing their first employment? 1229.

How did the President of one of our large industrial corporations rise to his position? 1230.

And tell about another President who worked his way up by changing jobs. 1230.

Give an illustration of how men rise in the banking business. 1230.

How did most of our leading business men begin their careers? 1231.

What is the advantage of learning your business thoroughly while young? 1231.

But what caution is given to starting too early and a too eager desire to make money at first? 1231.

What is the relation of a good general education to success in a profession? 1231.

What do young doctors do after having graduated from the medical school? 1231.

What is said about boys entering a trade? 1231.

What can boys do to perfect their education who have not had the advantage of high school? 1232.

What is the danger in the idea that



all education must be "practical"? 1232.

Describe the "elevator system" in use in many large business concerns. 1232.

What is the attitude of large business concerns with regard to young men of initiative, who have ideas for improvements? 1232.

Is it sufficient to be merely steady and reliable? 1232.

What good example did Benjamin Franklin's

father set to other fathers in helping his son to choose a vocation? 1233.

How do books help us to find out about the opportunities and conditions in various vocations? 1233.

In choosing a job, would you necessarily pick out the one in which you see the largest pay at the beginning? 1233.

What is said about the importance of educating one's self outside of school and college? 1233.

Which offer the most openings—the trades or the professions? 1233.

Name five good points to be observed in choosing a vocation. 1234.

What do you know about vocational training given in the colleges? 1234.

Where are some of the leading technical institutes located? 1234.

What is a correspondence school? 1235.

Lessons in



Other Lives

The life of Helen Keller is one of the most interesting topics in connection with June biographies, not only because this wonderful girl was born in June (June 27, 1880), but no nobler life could be presented for the consideration of young people in their last month of the school year. Think how wonderfully her mind has been developed and how little she had to work with compared to the young people in our schools.

In what state was Miss Keller born? 484.

Was she always blind and deaf? 484.

What was the cause of her loss of hearing and eye-sight? 485.

What was the name of the wonderful teacher who brought little Helen's mind out of the darkness? 485.

How did she teach her to spell? 485.

When did she first understand the relation between a word spelled on her hand and the thing which the word represented? 485.

How did she feel when she learned that there were signs for everything? 485.

How did she learn to speak? 486.

What famous girls' college did she attend? 486.

What has she written about and have you ever read anything she has written? 486.

Tell of some things that show her wonderful sense of touch. 486.

What does she do with the money she earns by writing? 486.

Who is called Dr. Knight of Labrador? 457.

How did he earn his Knighthood? 457.

From what great city did he go to live and work among the lonely fishing villages of Labrador? 458.

What are some of the perils of his work? 458.

What kind of a sledge did he ride on at first? 458.

Name some of the things he has done for the people of Labrador? 458.

How does he play Santa Claus to the little children? 458.

And what has he done to supply reading matter? 458.

Can you tell the pathetic story of the little Eskimo girl and her Christmas doll? 458.

How can you help Sir Wilfred in his work? 458.

Who is Mary Antin and how did she "discover America"? 482.

How did she feel about going to American schools? 483.

How to Remember Not to Forget

With a long vacation ahead of us, it is particularly important that we keep up some of the good mental habits that have been learned in school.

Whether you are a Boy Scout or not, have you tried the store window "stunt"? 1277.

How does practice strengthen the will as well as the memory? 1277.

What are some of the numerous

mental weaknesses that can be cured by remembering and the exercising of the will? 1277.

In what way do we owe our liberty to Washington's boyhood maxims? 1277.

What are the three most valuable mental traits? 1277.

How can you save time in getting your lessons? 1277.

Name some of the things you can do at home to train the observation and the memory. 1278.

What has understanding a thing to do with remembering it? 1278.

What had Lincoln to say on this point? 1278.

What is a good way to remember to mail a letter? 1278.

To remember the spelling lesson? 1278.

To fix the rules of Arithmetic and locations in Geography? 1278.

How can you best remember what you are to buy at the grocery store? 1278.

At what time of the day is the memory usually best? 1278.

In what part of the school day do the hardest lessons come, and why? 1278.

What is the advantage of a variety of studies in school? 1278.

How does "Friend Will" help you to win? 1278.

What is said about the conversations we hold with ourselves and about the better self in all of them? 1278.

Tell about the training in obedience and punctuality at West Point. 1278.

What is said about thoughts with aches in them? 1279.

And about the effect of bad company? 1279.

How do you cure the "blues"? 1279.

What is said about showing the door to harmful thoughts and inviting in good ones? 1279.

Fishing

Industry

How do men go "camping" in the water? 567.

Suppose you were a professional fisherman instead of just fishing for fun, how would you dress? 567.

Who wrote "The Three Fishers" and what is it about? 567.

Tell about the scene when a fishing fleet leaves port? 567-568.

What are the chief food fishes of the sea? 568.

What fish spend part of their time in the ocean and part in the river? 568.

What are the most popular fresh water fish? 568.

How do certain fish show that they understand geography? 568.

Why may cod and herring be said to take the "upper and lower berth" in their travels? 569.

How is the fishing done on the "grand banks" of Newfoundland? 569.

How did the sea birds help the fishermen? 570.

What are the three kinds of fishing nets? 570.

What is a trawl and how is it used? 570.

What kind of net is used for small fish? 570.

What is a drift net, and why and how is it used? 570.

Who makes the nets that many fishermen use? 571.

In what different ways are fish preserved? 571 and 576.

How many hooks do they sometimes use on one line? 576.

Describe the work of the little crab fishes as shown in the picture. 577.

What fish get homesick? 578.

Describe the canning of salmon. 578.

Describe the four methods of fishing illustrated while looking at the picture on 579.

Why is it the custom to fish at night in the Holy Land? 580.

Where do our oysters come from? 580.

How old is an oyster before he is big enough to eat and in what way is he like a tree? 583.

What are the great oyster months of the year? 583.



A Summer Trip Through the Rockies



Shade on an outline map of the United States the Rocky Mountain States. Write the name of each state across the face of it on the map, and then consult your geography to see if you are right.

In building a mountain system in the sand pile, what would you make first for the mountains to stand on? 117.

Why are mountains like soldiers on a march? 117.

How do the Appalachians and the mountain system in the western part of North America compare as to height? 118.

What kind of land lies between these great mountain walls of the West? 118.

Imagine you are a bird flying from the beginning of the Rocky Mountain system to the Pacific Coast and describe what you see. 118.

Through what part of the mountain wall does the Union Pacific pass? 120.

Where are the two great water sheds of the Rocky Mountains located? 120.

What is meant by mountain "parks"? 120.

How did the Rocky Mountains get their name? 120.

Why isn't there more rain in the Rockies? 120.

In what part of the Rockies are forests scanty, and in what part heavy? 120.

Tell about the firing line of the dead volcanoes and what happened in that

region once upon a time. 120-121.

How much of the country was buried in lava, and how deep? 121.

How are volcanic plugs formed such as you may see on your Western trip? 122.

Suppose in your summer tramp in Colorado, one of your companions would point to a tall flat wall, which geologists call a "dike," could you tell how it was made? 122.

What is a volcanic bomb? 122.

What is the Great Basin, and where is it located? 121.

What is the origin of Death Valley? 122.

How does it come that what was once a great fresh water lake is now the center of a desert of salt? 122.

How does the salt in Great Salt Lake compare with the salt in the sea? 123.

What important product is taken out of Death Valley? 124.

Describe a railway journey from the beginning of the Rockies to California. 131.

In what part of your journey would you see the most flocks and herds? 131.

What other industries are located in this region? 131.

Uncle Sam's Playgrounds

Where do the big trees grow? 134.

Describe the Great Central Valley of California. 139-142.

Where did Mr. Thompson Seton get those pictures of Johnny Bear and his mamma? 157.

Why is it that the bears are so tame that it was easy to get Johnny to sit for his picture? 157.

What about the bears that eat at the hotel? 157.

How large is Yellowstone Park? 157.

What would Yellowstone Park look like to you if you could take a bird's-eye view of it all at once? 157.

What is said about the geysers and what are geysers? 158.

In what other parts of the world are geysers found? 158.

What is there about spilling water on a hot stove lid that reminds you of a geyser? 158.

If you were going to have a pet geyser of your own, how would you go about it? How did the boys do it? 160.

Explain how this device of the boys makes the geyser go off every so often. 161.

How does it reproduce the geyser machinery of Nature? 161.

Have you ever visited the land of the geysers? If not, imagine that you have and write a letter home telling about it. 158.



What is said about the different dispositions of geysers? 160.

How did Old Faithful get its name? 160.

What does it look like when it goes off? 160.

Why don't green things grow immediately around the geysers? 162.

What do the geyser basins look like? 162.

What park keeps glaciers on exhibition? 165.

Where is it located? 165.

Why do the birds and glaciers sing together? 170.

Can you describe how the ice-man glacier takes a walk? 170.

Where is Estes Park? 166.

And what are the attractions there? 166.

Where is Mesa Verde National Park, and what does Mesa Verde mean? 168.

How would you reach Yosemite Park and how would it look when you got there? 172.

What is said about Sequoia and General Grant National Parks? 174.

Write a letter describing the attractions of Crater Lake, National Park. 182.

Imagine that you have visited the Grand Canyon and write a long letter home describing it. 189.

Pretend that the family will take its summer vacation in the West and draw a map like that shown, locating the parks you intend to visit. 193.

Our Wonderful Mississippi Valley

What is there about the Mississippi River System that reminds you of an oak tree in winter? 103.

How long is the Mississippi, and how does it compare in length with the other great rivers of the world? 103.

How does its network of tributary rivers compare with those of other rivers? 103.

How many miles of territory does it drain? 103.

When were the Black Hills of Dakota and the Ozarks on islands? 103.

The early resident of Wyoming lived in the Mississippi Valley when the valley was at the bottom of the sea. Describe how he looked and acted and ate his meals. 118-119.

How high does the Mississippi Valley lie above the sea level? 103.

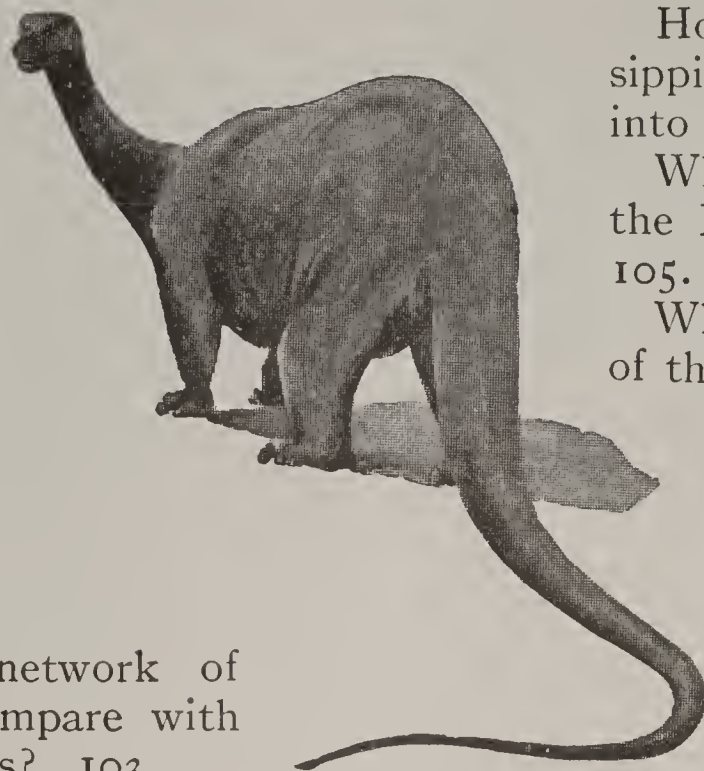
How long does the Mississippi travel to go 1500 miles? 103.

In taking a trip down the Mississippi River, what kind of a vessel would you ride in at the beginning of your trip? 104.

How wide is the Mississippi at its source? 104.

How much of a slope has the Mississippi from St. Paul to the Gulf? 104.

Why is the water clear until the Missouri pours its muddy waters into it? 104.



How wide is the Mississippi after the Ohio empties into it? 104.

What does the Delta of the Mississippi look like? 105.

What is the lowest port of the Mississippi? 105.

What do the people of Louisiana call the Delta Region? 105.

Why did not the early explorers discover the Mississippi from the sea, although they sailed into it? 105.

What was done with the river mouths so that vessels could get into them? 106.

How was the river put to work to deepen itself? 106.

How did the early settlers protect themselves against floods along the Mississippi? 107.

How wide is the flood plain in the Southern States? 107.

How long are the levees? 107.

What is the chief cause of the floods along the Mississippi? 107.

How was it proposed to control the floods? 107.

What are the chief crops of the Mississippi Valley? 108.

Why is the Mississippi Valley called the "world's food basket"? 110.

What is the largest city in the Mississippi Valley? 114.

Where are its minerals located and what are they? 114.

Visiting Our Neighbors on the North

No country offers more delightful attractions for people on their summer vacations than our great neighbor on the North, the Dominion of Canada. Those of us who go to Canada will find it far more interesting by getting acquainted with it first through Pictured Knowledge, and those of us who cannot go can enjoy many of the pleasures of real travel without any of its discomforts.

Describe Perce Rock; how does it happen to be standing off by itself? 210.

Why don't things grow on Perce Rock? 210.

What has Newfoundland to do with the mountains on the East coast of Canada? 211.

What European peoples first discovered that there was "good fishing" in the Grand Banks? 211.

How did the French come to settle in Eastern Canada? 211.

How long ago was this? 211.

Tell about the beginning of the fur industry in Canada. 214.

Tell how the French people worked their way farther West. 214.

Has the fur trade disappeared in Canada as it has in the United States? 214.

What is the reason for the existence of the fur trade in Canada in addition to the fact that it is less thickly settled than the United States? 214.

What is said about the great lumber organization of Canada, and what is now the center of the lumber trade? 216.

What does Canada do to protect her forests? 216.

What makes Niagara Falls? 217.

Tell about the three great Canals



that have helped to develop Canada. 218.

Tell about the beginning of the Railway system. 218.

How is Canada governed? 219

Tell about some of the things that attract travelers to Canada in summer and in winter. 222-226.

In what part of Canada do most of the people live? 207.

How large is this region? 207.

Give a bird's-eye view of it as you travel from East to West. 207.

Describe the natural tower on the eastern coast and tell how the waters carved it. 206.

In what way is the action of the water in carving these coast sentinels like the action of the fire stick used by the Indians in making fire? 296.

Where are the great forests of Canada? 208.

What picturesque trade, that you read about in the early history of Canada and the United States, is carried on in these forests? 208.

Of what benefit are these forests to the people of the South in the winter time? 208.

Describe the region of the ice bergs off the Eastern coast of Canada. 207.

What are the Grand Banks? 209-211.

Fourth of July

What is it that we celebrate on the Fourth of July? 991.

What witty remark did Franklin make in connection with the signing of the Declaration of Independence, and what effect do you think it had? 991.

How is the spirit of the signers indicated in the character of their signatures? 991.

How long after the Declaration was signed was it read to the public? 991.

How was the old Liberty Bell used to proclaim the news? 993.

What was the prophetic inscription on this bell? 1728.

Who was the author of the Declaration of Independence? 1542.

How old was he when Patrick Henry made his first great speech and what effect do you suppose it had on Jefferson? 1542.

What did Jefferson write before writing the Declaration that attracted wide attention? 1542.

What was his reputation while in college? 1542.

What were the characteristics that quickly made him a leader of men in the Continental Congress? 1542.

Can you describe his appearance? 1542.



Why, among the five men appointed to draft the Declaration of Independence, was the work of writing it left to Jefferson? 1542.

What is said of the Declaration as compared with other political documents? 1542.

In what way did Jefferson show that he regarded the Declaration as his most important public work? 1543.

What is meant by the "sane Fourth"? 993.

Name some of the ways in which the Fourth is now celebrated. 993.

Who was the soldier who achieved one of the greatest of military victories in a time of peace? 436.

Who was it that decided to put the building of the canal in the hands of army officers? 437.

What is said about the wisdom and energy of Colonel Goethals? 438.

Illustrate how hard he worked. 438.

What was his "Trouble Court"? 438.

Illustrate how he handled complaints. 438.

Tell about Colonel Gorgas, the soldier doctor, and how he "cured" the Isthmus of fever and mosquitoes. 441.

Safety First

The long school vacation, which begins in July, is full of danger for heedless young people. Remember it is always better to be safe than to be sorry.

How does the diagram at the head of our article on "Safety First" illustrate the dangers from which we should be on guard? 1111-1112.

What are some of the things people should be on guard against in connec-

tion with illuminating gas in the home? 1113.

What makes gas explosive? 1113.

What precaution should be observed in lighting the gas range? 1113.

What is the advantage of having your bedroom windows open at night in addition to the benefit of fresh air? 1114.

What is said about the danger from sewer pipes? 1114.

What caution to roller skaters is contained in the illustration on this page? 1114.

How does the gasoline engine illustrate the dangers from the gasoline? 1114.

What precaution should be taken with regard to poisons? 1115.

What is the danger in the use of rat poison? 1115.

Why is it much more dangerous to go bare-footed in towns and cities than in the country? 1116.

What should be done when you step on a piece of glass or a rusty nail? 1116.

Give in your own language the six rules of the road. 1116-1118.

Why are women in special danger in getting on and off trolley cars? 1119.

What rules should be observed for safety in connection with trolley cars? 1119.

What is said about live wires? 1119.

Can you give the "Safety First" "street alphabet"? 1119.

What is said about the dangers at railroad crossings and how to avoid them? 1120.

What do you think about boys on bicycles trying to beat a car across a crossing? 1120.

What about mothers who let little children run at large? 1121.

What about getting on and off cars before they stop? 1121.

What do the statistics of one great railroad system show in regard to the enormous loss of child life from carelessness? 1121.

What is said about the third rail? 1122.

And the dangers to fingers from open doors? 1122.

Can you name nine ways of preventing fires? 1123.

What is said about "Safety First" in school and in public places? 1123-1124.

About "Safety First" in shops and factories? 1125.

Plants to Be Left Alone

You will be spending a good deal of time in the woods and fields in the long vacation season, and you should pay particular attention to the article on Poison Plants.

What kind of leaf has the poison ivy? 353.

How can you tell it from the Virginia creeper? 353.

What would you do if, in spite of all your caution, you were poisoned by this ivy? 353.

After studying and copying the leaf of the poison ivy several times, see if you can redraw it from memory so that you could show somebody else what the poison ivy looks like. 354.

Do the same thing with poison sumac. 354.

And other poison plants mentioned. 354.

How can you tell the poison sumac from the non-poisonous sumac, although they look so much alike. 354.

What poison plant looks very much like calamus root that boys like to eat? 355.

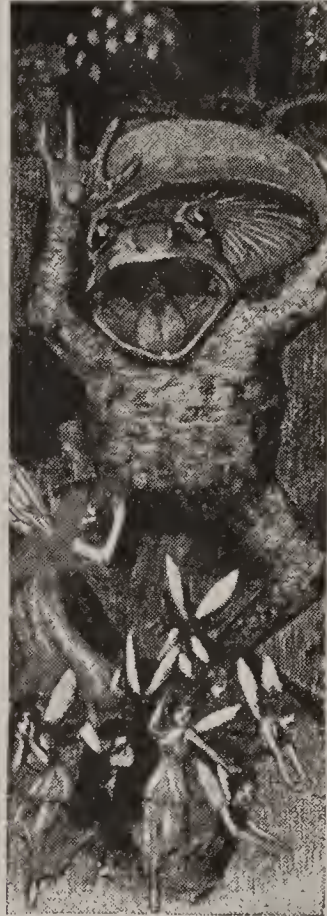
Do you know the danger of eating parsnips that grow wild? 355.

What does the poison hemlock look like? 355.

Where is the poison hemlock to be found? What two kinds of poison hemlock are there, and why is one of them called the "spotted cow bane"? 355.

What dangerous cousin has the pretty yellow buttercup? 355.

To what family does it belong that



is well represented in our flower gardens? 355.

To what family does the bachelor's button belong? 355.

For what is powdered hellebore roots used? 355.

What wild cousin has the geranium, and how does it sometimes make people ill? 356.

To what family of poisonous plants do Indian tobacco and cardinal flower belong? 356.

Describe the Indian tobacco plant. 356.

What is it about this plant that is dangerous that curious children are liable to taste? 356.

What are the only wild berries that are safe to eat? 357.

What is the danger of eating wild elderberries, although they are not poisonous? 357. And what is the danger in eating wild grapes? 357.

What did Billy say about horseradish and what did the teacher say to him? 357.

What did the teacher say about the danger of mistaking toadstools for mushrooms? 357.

The henbane is a very pretty plant to look at and to draw, and a very useful one to know. What does it do to chickens and people? 358.

The Story of a Cup of Tea



In July the tea harvest in China and Japan is drawing toward the end. The Japanese tea picker in our story is just as cheerful about her work as the girl in our picture here, but she isn't wearing a teacup on her head nor carrying a teapot on her back. What is she doing?

When do the women and children first go into the garden to pick the tea leaves? 1318.

Why must the pickers be very careful? 1319.

Which of the leaves make the best tea? 1319.

How many pickings are there in a year and in what months do they come? 1319.

How is the tea cured? 1319.

Did you ever try rolling tea leaves, as suggested in our story of tea? 1320.

Who does most of the work on the small tea farms? 1320.

How is the tea cleaned and graded? 1320.

What makes the black tea black? 1320.

In what other country besides China and Japan is tea raised? 1320.

Why don't we raise tea in our southern states, although the climate seems suited for it? 1321.

Tell how the tea gets to market in China, Japan, Ceylon and Java? 1321.

Why is the tea packed in foil? 1321.

What large country uses tea that has not traveled over the water? 1321.

What color are the tea blossoms? 1317.

Do they have any odor? 1317.

How do the people give a "coming out" party to tea plants? 1317.

How do the people sit when drinking? 1318.

What do tea plants look like in the winter? 1318.

What is the shape of the leaf? 1318.

In what respect does it resemble the willow leaf? 1318.

How tall is a tea tree? 1318.

How old is a tea tree when it yields its first crop? 1319.

How long do tea trees live? 1319.

Why are tea trees only mere shrubs when they might be trees twenty feet high? 1319.

A Trip Down East



During the summer vacation, Western people often visit the East, while Eastern people go out West. In Pictured Knowledge we can do both. Suppose we take a little jaunt through the Middle Atlantic States today.

Why are the Middle Atlantic States sometimes called the "Keystone Group"? 39.

Why are these states like a corner stone? 39.

Why is the great ocean that washes the shores of these states the busiest highway in the world? 41.

Why did more important ports grow up on the Middle Atlantic Coast than on the New England Coast? 41.

What are the three most important port cities of this group? 41.

What have the Great Lakes and the Ohio River to do with the development of these Eastern cities? 41.

What other advantage have these cities over New England besides their location? 41.

What are some of their natural resources? 41.

What chief source of power have they which is also possessed by the New England cities? 31 and 41.

What mountain wall stands between the cities of the Middle Atlantic and the inland water ways? 44.

How does traffic get through these mountains? 44.



For what purpose did the Indians use the Hudson River water gap before the white man came? 47.

What is the nature of the mouth of the Hudson and why did Henry Hudson think it was an ocean strait? 48.

What is this part of such rivers called? 48.

What is supposed to have tipped up the land and "drowned" the mouth of these rivers? 49.

Why do they catch so many shad in the mouths of estuaries? 49.

Where are the oyster beds found? 49.

What are some of the things we see growing on the farm lands as we travel through these states? 50.

What is said about farming in Colonial days? 50.

What is the nature of the sights in the industrial regions, and what are some of the leading industries in the various states? 56-61.

Describe a trip up the Hudson. 62.

In connection with summer and our little friend who is evidently about to dive into the "ol' swimmin' hole," tell us something about the famous bathing beaches. 63.

How the Hot Winds of August Help Turn the Stones to Bread



Hot Weather and the Formation of Soil

In what way does a hot day help to make soil? 190.

In what way do roots help to break up rock and make soil? 672.

How does the plant get its soil food? 673.

How does Nature arrange it so that rain will not waste away the food in the soil? 673.

What three food elements are found in most soils? 673.

What two things is it usually necessary to supply in soils? 673.

Where did the soil come from? 674.

How do plants in dying help to improve the soil? 674.

What is the difference between soil and subsoil? 674.

What is meant by "residual or sedentary soil"? 675.

Do farm lands ever move? 675.

In what way do soils travel? 675.

Where did the best farms of the corn belt come from originally? 675.

Into what eight classes are soils divided? 675.

Name the four best soils in the order of their merit. 675.

What are weak soils? 676.

What are stingy soils? 676.

Why won't plants grow in clay soil? 676.

How do you make clay soil mellow? 676.

What living creatures in the soil help to improve it? 676.

What is said about the farmers' little friends and enemies in the soil—bacteria—and how to deal with them? 676.

What colored soils are most productive? 676.

How does the soil talk about itself? 677.

In what kind of land do you find the sour sorrel that boys like to eat? 677.

How do soils become poor? 678.

From Alaska to the Panama Canal

How much an acre did Uncle Sam pay for Alaska? 219.

How many states does the main part of it cover when laid over the United States? 219.

What is said of the condition of things when the United States bought it? 219.

What one of its natural resources was wasted during the years of our neglect? 220.

How did the killing off of the seal help to discover what a remarkable bargain we had in the purchase of Alaska? 220.

Why is it that Alaska is not good for farming, although the soil is so rich? 220.

Where were the first important gold discoveries made? 221.

How did men reach the gold fields? 221-222.

Tell about the beginning of the development of Alaska as the result of these gold discoveries. 222.

Tell about the Government of Alaska. 224.

How did the Agricultural Department encourage farming? 224.

How close are the mountains to the sea in Alaska? 225.

How are they getting new islands along the coast of Alaska? 226.

Make a word picture of the coast of Alaska. 226.

Why are there such heavy forests clear from California to the tip of Alaska? 227.

Why do they "grow" such fine glaciers in Alaska? 227.

What is the difference between the living and the dead glaciers? 227.

What happens to the land as the old glaciers die away? 227-228.

What are some of the different things glaciers do to the land? 228.

What kind of climate do they have in Alaska? 228.

How does it look in Alaska in May and June? 229.

How would it feel if you were up in Alaska at this time of the year? 229.

How many hours does farm work go on during the busy season in Alaska? 229.

Write a letter or a school paper describing a trip to Alaska. 229-239.

How Uncle Sam Dug the Great Canal

How wide is the Isthmus of Panama at its narrowest point? 227.

In what way is it compared to a land slide on a railroad track? 227.

How much difference does it make whether you get past the Isthmus by going around South America or sailing straight through as we can do today? 227.

How long was it from the time people wanted to get the Isthmus out of the way of water traffic to the time when they actually constructed the canal? 228.

What white man first discovered that there is a big ocean west of the Isthmus of Panama? 229.

Did the idea of building a canal occur to Balboa? What did he say about it? 229.

Do you suppose Balboa realized the difficulties of getting through this little strip of land? 230.

Describe the Chagres River and the jungle. 230.

Is there anything pretty in the jungle? 230.

Of what blood are the majority of the inhabitants of Panama? 231.

Some Strange Water Animals

Everything about Nature is particularly interesting in summer when all things are alive; so suppose we talk today about strange animals of the water world and some curious homes of animals.

Speaking of diving, how deep can a whale dive and how long can he stay under? 375.

Does he do this often? 375.

Why isn't a whale a fish? 375.

Why is it that the whale, although so large, lives on little fish? 376.

How does he use a "seine" in fishing? 376.

What is said about the playfulness of whales? 376.

In what respect does a whale resemble an elephant and in what way a cat? 376.

Why is the sperm whale, although not so large as other members of the whale family, known as the "monarch of the sea"? 376.

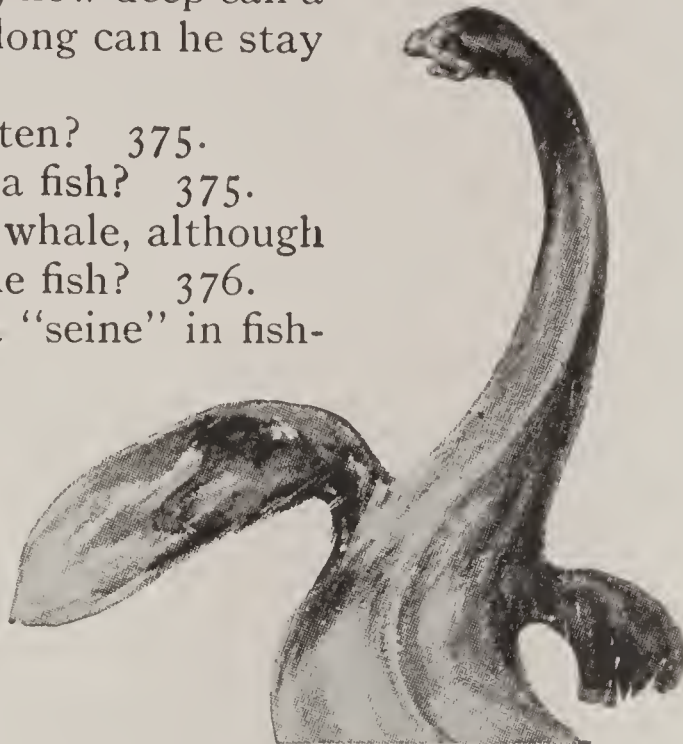
What animals are "mixed up" in the seal? 376.

Imagine you have seen them feed the seal in one of our city parks, and tell how it looked. 376.

Where are the baby seal born? 378.

What is there about the disposition of seals that reminds us of little people who are said to be "all eyes and ears"? 378.

Where do seals live in the winter time? 378.



Is the walrus any relation to the seal? 378.

How does he compare in size? 378.

Why is it improbable that the walrus and the carpenter were walking hand in hand? 378.

What fish are known as the "tigers of the sea"? 378-379.

What fish is referred to as a "pirate"? 379.

How large is the sword fish? 379.

How does the sun fish build his nest? 380.

To what bird is the stickleback fish compared, and why? 380.

Who builds the nest—papa stickleback or mamma stickleback? 380.

How is the stickleback's nest put into shape? 380.

Tell about the fish that makes a nest of bubbles and how he does it? 380.

Summer is the season when stories are sometimes started about sea-serpents. Were there ever really such strange creatures as are described in these summer sea-serpent stories? 384.

Some Curious Homes

What is said about animals as home builders? 361.

What kind of tools do our brothers of the animal kingdom have in building their homes? 361.

Tell about the little people who build glass houses on the cliffs. 363.

Did you ever see an oriole's nest?

What does it look like? 363.

Tell about the birds that build tenement houses. 363.

How are these houses built; all at once? 363.

Do the people in these apartment houses have any guests? 363.

Do you girls know about the bird

that sews her nest? If so, tell about it. 364.

What do you think about birds that dig their nests? 364.

Isn't Mr. Hornbill a queer old chap? Tell us about how he takes care of his mate. 364.

Would you imagine that birds would lay out cities with squares and streets? Look and see if this isn't so. 364.

What about birds that build homes strong enough for a man to stand on? 365.

How do these birds show that they have an art sense? 365.

And speaking of the art sense—the same thing that makes us like pictures so—what does the bower bird do that is so wonderful? ("Playgrounds for bird babies.") What do you think of that! 365.

Did you ever study a bumble bee's nest? It's very interesting and entirely safe if there are no bumble bees at home. 367.

How does the wasp build her paper

house and what does it look like? Make a sketch of it from memory and then see if you are right. 367.

What does the home of a mole look like? 368–371.

How does the trap door spider play Jack-in-the-box? 369.

Tell about the people of Prairie Dog Town and follow a prairie dog down into his hole. 369.

How does a certain beetle make a nursery with a leaf? If you think you remember, draw a picture of the finished house and then look to see how near you came to it. 370.

Where does the field mouse build her home and what does it look like? 371–372.

What is the home of the gopher like? 371.

You know about tent caterpillars of course—they make so much of caterpillars in school—but do you know about the caterpillars of Mexico who live in a bottle? Yes, and make the bottle themselves! 372.

The Boy Scouts

What is the chief purpose of the Boy Scouts? 1237.

What advantages did boys have several generations ago compared to those they have today? 1238.

What is the disadvantage of having plenty of spare time and no good way to spend it? 1238.

What did this condition of things have to do with the establishment of Juvenile Courts? 1238.

Who was Baden-Powell and what did he do of especial interest to boys? 1238.

What are the boys shown to be doing in the picture on this page that is part of the training of soldiers in our army? 1239.

What two words express the great fundamental purpose in the Boy Scout organization? 1239.

What is the oath you have to repeat when you become a Boy Scout? 1239.

What is the Scout law? 1240.

What about Boy Scouts taking tips for acts of courtesy? 1240.

And what about being kind to animals? 1240.

Are Boy Scouts ever supposed to get grouchy? 1240.

What is said about the Boy Scout traveling with a "clean crowd"? 1242.



Name a half dozen of the numerous things that Boy Scouts do. 1243.

Do grown people have anything to do with the work of the Boy Scouts? 1244.

How did a Boy Scout in London start the Boy Scout movement in the United States? 1245-46.

What has the President of the United States to do with the Boy Scouts of America? 1247.

Where are the National Headquarters of the American Boy Scouts? 1247.

How old must you be before you can be a Boy Scout? 1248.

What do they call a Scout who has just joined the organization? 1248.

What do you have to know and what do you have to do before you can get to be a Boy Scout at all? 1248.

What do you have to do to get into the second class? 1248.

Then how do you pass into the first-class rank? 1249.

What are some of the kinds of study for which the special merit badges are awarded? 1251.

What is the relation between books and education in the Boy Scout organization? 1251.

What are some of the big things the Boy Scouts have done? 1252.

The Camp Fire Girls



In what are all young people—boys and girls—so much alike? 1255.

What is the purpose of the Camp Fire organization? 1255.

In what are the Camp Fire girls and the Boy Scout organizations alike and in what way are they unlike? 1255.

What is the origin of the Camp Fire? 1256.

How extensive is the Camp Fire organization? 1256.

What does "Wohelo" mean in Camp Fire language and how did the word originate? 1256.

What is the symbol of the Camp Fire and why was this chosen? 1256.

In what way does the Camp Fire work make common every-day life and duties attractive? 1256.

What is the law in Camp Fire? 1257.

What are the six requirements for the rank of Wood Gatherer in a Camp Fire? 1257.

What comes next after the rank of Wood Gatherer and how does a girl attain this rank? 1257.

Have chewing gum, candy, and ice-cream sundaes anything to do with it? 1257.

Suppose you have complied with all the conditions required to become a

Fire Maker, what do you say as you rise to speak at the Council Fire? 1258.

What is the highest rank in the organization and how is it attained? 1258.

Is the rank of Torch Bearer the last honor you can win? 1258.

How are the honors a Camp Fire girl wins, designated in the things she wears? 1258.

What does cleaning dirty alleys have to do with Camp Fire work? 1258.

What is necessary in order to start a Camp Fire organization? 1259.

Suppose there is no Camp Fire organization in your community and you are going to start one, how would you do it? 1259.

What are the qualifications of the Camp Fire guardian? 1259-1260.

How often are Camp Fire Councils held? 1260.

Why are not outsiders invited to these gatherings? 1260.

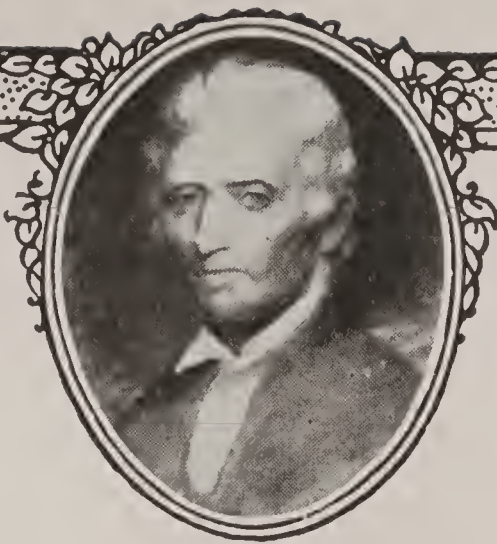
What is said about the ceremonial gown and the advantage of having each girl wear one? 1260.

How are the Camp Fire girls supposed to start their fire? 1261.

What is the difference between the weekly and monthly meetings? 1261.

Why does the Camp Fire make such a strong appeal to the girls? 1261.

QUESTION
FOR



OUTLINES
SEPTEMBER

The Work of The Pioneers

How big was the United States at the close of the Revolutionary War? 1551.

How did the pioneers help in the work of expanding the little country into a great Nation? 1552.

How would you like to have been a boy in the pioneer days? What would you have done if you had been a boy at that time? 1553.

What did the country look like in Daniel Boone's day? 1553.

How did the people live? What kind of houses did they have? What were the floors made of, and the doors and the tables and chairs and the beds? 1553.

What did they do for bed clothes and mattresses? 1553.

Were the chimneys built of bricks? 1553.

What did they raise to eat? 1553.

Did they have domestic animals? 1553.

What did mother have in the way of kitchen ware? 1553.

How long did Daniel Boone live in the midst of these pioneer conditions? 1554.

Tell about the three streams of migration and what they had

to do with certain great railroad lines of today. 1555.

What were flat boats, and why did they never make the same trip twice? 1555.

Why were the Indians so hostile to the settlement of their country by white men? 1556.

Tell the story of the "Bird Woman." 1559.

Why was she called the "Bird Woman," and why did she guide Lewis and Clark and their followers in their great expedition? 1559.

How did "The Great American Desert" get its name? 1560.

Tell how the Lincoln family "lit out for Indiany," and how little Abe "toted the gun." 1561.

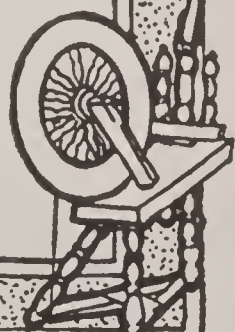
How did Abe and his cousin Dennis help in keeping the family fed and clothed? 1562.

What was little Abe's first book and how did he do his writing lessons? 1562.

Tell about the growth of the Middle West. 1563.

And about the early days of road making and canals. 1564.

Were these new routes of traffic popular? 1564.



Education and Good Manners

It was because it recognized the great importance of good manners in true education of mind and heart that the great English school has taken for its motto the phrase we use as a title of this department—"Manners Makyth Man." And you have seen how the idea of good manners—regard for the rights and feelings of others—runs through that great organization, "The Boy Scouts."

What did George Washington do as a boy to regulate his manners? 1267.

What other man eminent in Washington's day is mentioned as having done a similar thing? 1267.

What is said about the common idea of "the proper thing"? 1268.

What is said about common sense in good manners? 1268.

And about over-staying our welcome at a friend's house? 1268.

What is the meaning of the word "etiquette"? 1268.

Why is "tact" a more interesting word? 1268.

What is said about its importance? 1268.

What have good manners to do with the making of friends? 1269.

What is the difference between really good manners and "company manners"? 1269.

Where is the best place to practice good manners? 1269.

What have untidy clothes at home to do with manners? 1269.

What is said about people of loud behavior? 1269.

Do people with real refinement attract attention in a crowd? 1269.

What is the difference between the manners of



boys and the manners of girls? 1269-1270.

What is the fundamental thing in being a gentleman? 1270.

What is said about good manners at school? 1270.

Why is it bad manners not to get your lessons? 1271.

What did Barrie say about being kinder than is necessary? 1271.

Is there such a thing as manners on the playground? 1271.

What is said about courtesy toward the parents of people you are visiting? 1271.

Did you ever hear of a boy throwing his clothes all around the room when he undressed? What do you think about it? 1271.

Perhaps there isn't much danger about your being late to your meals—if you are a boy—but how about your table manners? 1271.

Did you ever help an old lady with a heavy suit case? 1271.

Did you ever hear people talk so loud at the movies that they annoyed their neighbors? 1271.

Do you give your seat in the street car to women and old men? 1271.

What is said about good manners on paper? 1272.



How Tom Edison Went to School



The life of Edison is particularly interesting at the beginning of the school year, because, like all boys, "Tom" Edison loved to go to school, that is to say, he liked to find out about things and that is what school is for; to tell us about the world and how things are done and how to make something of ourselves, as Edison did.

Do you remember why Edison's mother called him "sobersides?" 473.

Why, do you suppose, did he want to read all the books in the public library? 474.

What was his business when he was twelve years old; and how did he educate himself while still attending to his duties as train boy? 474.

Did he let his interest in "tinkering" interfere with his work as a telegraph operator? 474.

What did he do with all his spare money? 474.

Why didn't he have a clock in his factory? 474.

How much sleep did he get for the five days preceding the first time his phonograph talked? 474.

Does Mr. Edison find it easy to invent things? 475.

Did people believe, at first, that he could do the things he said he could? 475.

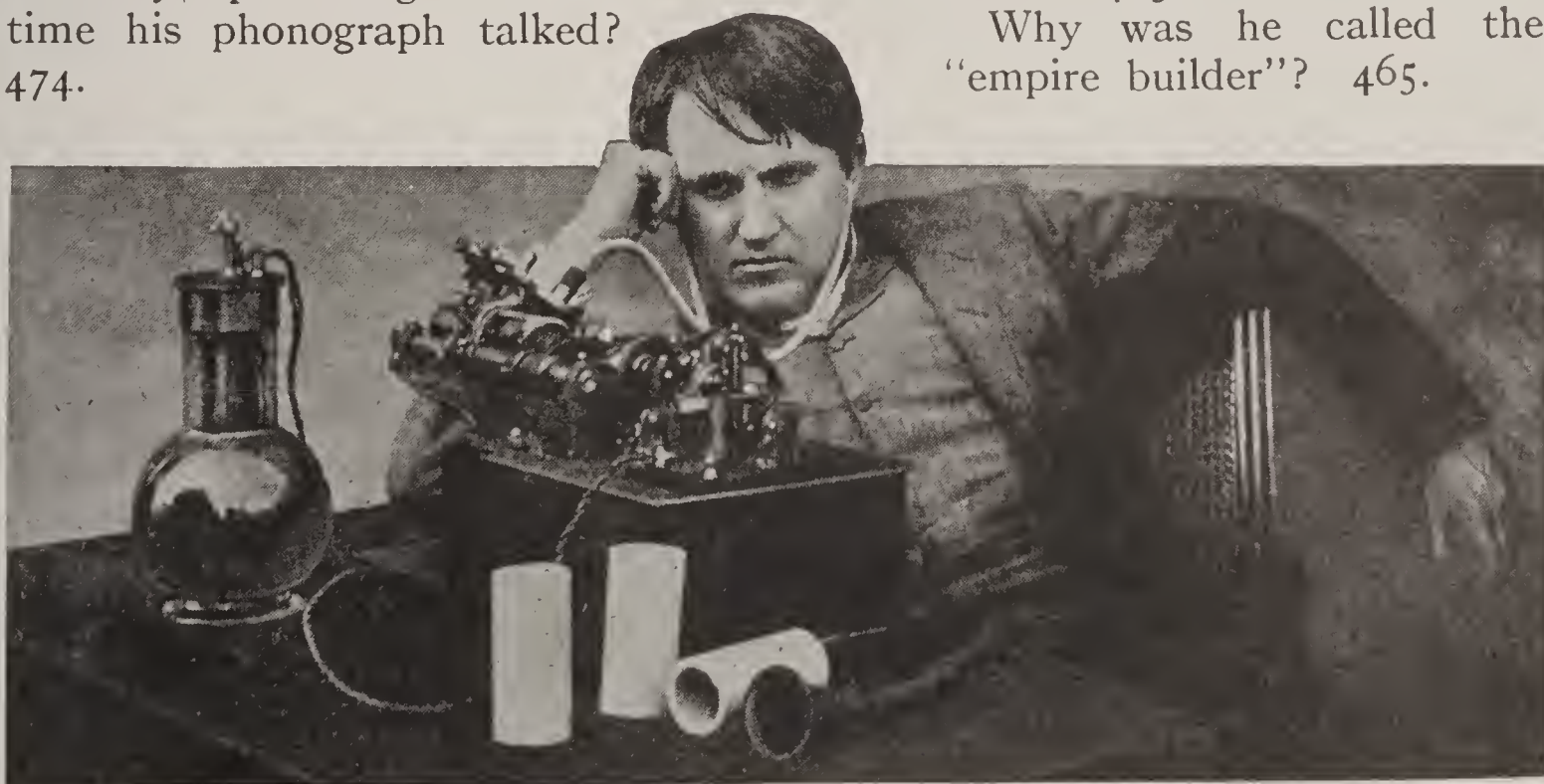
Did Hill, the great railroad builder, care much about books? 463.

How could he learn so much from books when he was working hard all day? 464.

Why was it that men with capital were willing to invest in his enterprises; what do you suppose the knowledge and training he got from study had to do with it? 464.

How did he put his geography to work? 465.

Why was he called the "empire builder"? 465.



How Butterflies Get to School In Autumn

Isn't it interesting to gather cocoons in the Autumn and then watch them turn into beautiful moths and butterflies in the school room?

Why is the moth in the title heading shown carrying a lantern? 407.

If you happened to see a moth in the day time, how could you tell him from a butterfly? 407.

What is the difference between the antennæ of the butterflies and the moths? 407.

Is there any difference in the shape of their bodies? 407.

Tell how excited a great man got over seeing a butterfly. 408.

Why is a butterfly so hard to catch? 409.

In which is there the greatest variety of markings—the moths or the butterflies? 409.

Why does Mr. Moth have such big eyes? 409-410.

How can you tell just the right kind of leaves to feed your caterpillar? 411.

How can you keep the food fresh without drowning the babies? 411.

Are all butterfly and moth eggs alive? 411.

Explain to mother, or one of your brothers or sisters about the four stages of the life of the two-tailed pasha



and make a little sketch of your own to show as you go along. 413.

Why isn't a caterpillar a worm? 414.

How can you sometimes tell whether a caterpillar will turn into a butterfly or a moth? 414-415.

Where is the best place to look for the cradles in which moths and butterflies are born? 415.

Tell about the wonderful structure of the butterflies' wings. 415.

How is the body of the butterfly divided? 417.

What is the mouth like? 417.

How many legs has a butterfly? 417.

What butterflies are harmful? 418.

What harm does it do to touch butterflies? 417.

How do some moths and butterflies protect themselves from their enemies? 416.

Would you think that the picture on this page represented a butterfly or a moth? 414.

Now look under the picture and see if you are right.

The Farm in Autumn



What is the most important grain food in the world? 684.

Where is wheat found growing wild today? 684.

What is said about the growing of wheat and the development of scientific agriculture? 684.

What did the first plow look like and how did they cover the seeds? 684.

How did primitive man harvest his wheat? 684.

What great people invented the cradle? 680.

Can you name the seven kinds of wheat shown? 685.

Tell something about the geography of wheat? 685.

How is rice grown? 686.

Where is kaffir corn grown? 687.

What is it used for in this country? 687.

From what is most of the world's cloth made? 687.

What valuable things are furnished by the cotton plant besides the fibre for cloth? 687-688.

What proportion of the world's cotton crop comes from the United States? 688.

Into what two classes is cotton divided? 688.

How do cotton farmers improve their crops? 689.

Would you expect much cot-

ton from a large seed? 688.

What is said about the cotton weevil and how to get rid of him? 688.

What are peanuts good for besides being good to eat? 689.

How does clover and other legumes help to grow corn, wheat and cotton? 689.

Why is alfalfa such a valuable plant on the farm? 690-691.

Suppose you intended to grow alfalfa, how would you go about it? 692.

How did man first get his farm animals? 692.

When did the white man first discover the Thanksgiving turkey? 692.

How many pounds of grain and hay does it take to make a pound of beef? 694.

A pound of pork? 694.

How did man improve the character of the wild animals he tamed? 694.

What did man have to do with the varieties of coloring in animals? 695.

Do all draft horses belong to the same breed? 695.

Where do the Shetland ponies come from? 695.

What cattle are kept for the milk they produce? 696.

New School Clothes for Dolls and People

How do you make a running stitch? 733-734.

What is basting? 734.

In what two ways do you use the needle in making gathers? 734.

What is said about making each stitch meet the last? 734-735.

What is back stitching? 734.

What is the difference between over-handing and over-casting? 774-775.

In hemming, how do you keep your hem the same width? 735.

What kind of a hem do you use for sheer material? 735.

How do you make a French seam? 735-736.

Is it so easy to make a buttonhole? How do you do it? 736.

And can you sew on buttons that will stay a reasonable length of time? (Of course you can't expect too much of anybody, especially on little people's clothes!) 737.

And how do you keep hooks and eyes from parting company? 737.

Suppose you had to patch a dress or little brother's trousers, how would you do it? 737.

And how do you heal the wounds in embroidery and



lace, and in stockings when the toes begin to peek through? 738.

Of course you know the prim little lady with the big bow in her hair. That's Miss Chilton, Mary Chilton, the doll. Let's make her a mid-dy blouse. How do we start? 740.

After the blouse is basted, what do we do? 740.

How do we make her collar? 740-744.

How about her patch-pocket? 741.

How far along should the blouse be when we try it on Mary? 741.

Now tell how we should make the bloomers. 741-742.

And she must have stockings; what shall we do? 742.

And a cambric hat. 743.

Now for the union underwear. 743.

And a nice white petticoat. 743.

And a party dress; of course, a party dress! 744.

And when she goes to bed? 746-747.

How are you going to make that scarf for mother's bureau? 746.

What is meant by an applique? 746.

How do you strengthen the cut edges? 746.



In the World



of Numbers

Could you step to the blackboard at school, or tell on your slate or a piece of paper at home, what the small boy is telling about fractions. 272.

How does the clock show us what $\frac{1}{4}$ in fractions means? 272.

What fraction would express the position of the minute hand when it reaches six? 272.

And when it gets to nine? 272.

What fraction expresses the difference between each of the figures on the clock's face? 273.

What part of a day is one-half? 273.

What part of the day does the short hand mark from hour to hour? 273.

What part of the whole day is represented by the distance between 12:00 and 1:00, when traveled by the minute hand? 273.

Why do you add only the numerators in adding fractions? Why slight the denominators? 273.

Are you posted on the "common denominator business"? 273.

How does the clock invert the divisor? 274.

How do fractions act when you multiply? 274.

What did the fingers have to do with putting decimals into the school? 275.

How can Black-eyed Susan teach you about decimals? 276.

If petals were pennies, how many ice-cream sodas, costing a dime could you get with a Black-eyed Susan? 276.

How many cosmos flowers would pay for a 50c circus if the petals were dimes? 276.

Why do they use an naught in decimals? 278.

Can you explain about the mills in a decimal with rose leaves? 277.

What is the advantage in working with decimals? 277.

How did mother explain about multiplying with decimals? 277.

In what way are fractions related to decimals? 278.

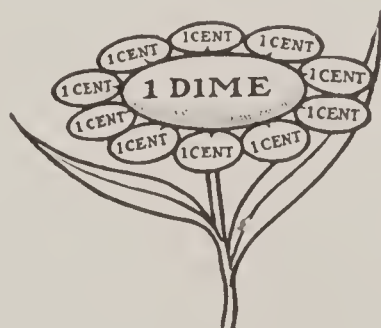
How did mother untangle the division problem? 278.

How can you find percentage in a pie? 279.

Why was Polly wrong when she said one-fifth of a pie is 5%? 279.

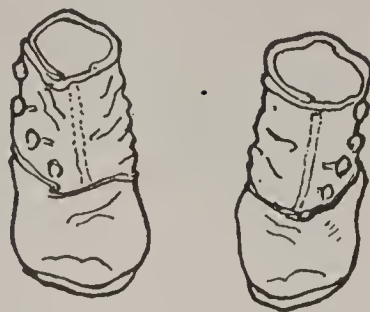
Draw a pie and cut it into 20% slices; into 10%; into $14\frac{2}{7}\%$; into $6\frac{2}{3}\%$. 280.

Tell how you change fractions into decimals. 280.



Queer Relations of Old Shoes

The Shoe



Industry

Of course, everybody knows that leather belts are supplied by the leather industry, but how much of a tennis racket comes from the packing house? 537.

Can you answer the same question with regard to the guitar, the drum, the jackknife, buttons and combs—all without looking at the reading matter? Now look and see if you are right. 537.

See how the dictionary defines “by-products,” and then tell us some of the by-products of the leather industry. 537.

Why do the big packing houses carry talcum powder? 537.

What has the hemlock back of the big moose to do with the leather industry? 537.

What parts of a leather-bound book are furnished by the packing houses? 537.

How many things made wholly or in part of leather have you in your house? 538.

How did mother make moccasins in the early days? 539.

How did the Indians do their tanning? 539.

How did mother and the boys help in making leather among the pioneers? 539.

Can you draw a map of the world and show on it the regions where cattle and sheep are raised? 540.

Why did the pioneers put leather in lye water before scraping it? 539-540.

In what way are oak galls, sumach leaves and tea leaves alike? 540.

In what shape do hides come to the tanners and how are they treated? 545.

How do they say “Hurry up with your tanning, Mr. Tannin,” in a tannery? 545.

What do they do to the skins after they come out of the brine bath? 545.

How do they make the leather for patent leather shoes? 545.

Where are the biggest shoe factories, and why is it that none of the workmen can make a shoe? 546.

Tell about the old shoemaker who used to visit farm houses? 547.

What did the Civil War have to do with the development of the shoe industry? 547.

Take an old shoe apart and tell us what you find. 548.

What part of shoe-making reminds you of cooky-cooking day at home? 545 and 549.

Tell some of the steps in the making of a shoe. 550-551.





QUESTION
FOR



OUTLINES
OCTOBER



Some Playmates in the Home

Of course animal pets are nice to have and talk about at any time, but the discussion of them in school in the winter time is especially interesting because there is so little "Nature Study" to be had out-of-doors.

Do you have a little house for the ants in your school, or did you ever try keeping them at home? How would you make an ant home?

855.

How do you use window glass and matches? 856.

Draw an ant house, taking the picture shown for your model. 855.

How will you get ants to come and live with you? 856.

How can you help the ants keep house? 856.

Tell about some of the various interesting things you can see the ants do and other things about the lives of these wonderful little people. 856 and 419-430.

How do you make friends with a squirrel? 858.

Tell how you would make a squirrel cage. 858.

And about the nest box. What do you make the squirrel's bed out of? And how do you provide a little gymnasium for a squirrel to perform on? 858.

What is the object of feeding squirrels shelled nuts, besides giving them something to grow on? What do they eat besides nuts?

859.

Do you suppose they would care for bread and milk? 859.

Think of feeding a baby squirrel with a spoon! 859.

Now about making bunny comfortable; what are the two most important things to be provided for? 859.

Tell about how you would provide bunny with a house and lot. Is it necessary to be careful about the roof and is there any danger from drafts? 859. Where do you put the bed chamber? Is it good for a rabbit to live on the bare ground? 859. What do you feed bunny? 860.

Do you know what to do when the little bunnies come? 860.

Do you know how to take care of canaries? 863.

Should you give them all of everything they want? 863.





How Food Is Stored for the Winter

Where do the oranges and other citrus fruits that we have in winter come from? 99.

Why is it that they can be shipped such long distances? 100.

Where do pineapples come from and what do they look like in the field? 100.

Where do bananas come from and what does a banana grove look like? 100.

What state furnishes our white grapes? 100.

Where do the raisins come from and what do they look like when they are growing? 100 and 136.

What country furnishes the dates? 100.

And what makes them so sweet? 100.

Where do our peanuts grow and who eats them? 101.

Where do we get our pecans, English walnuts and chestnuts? 101.

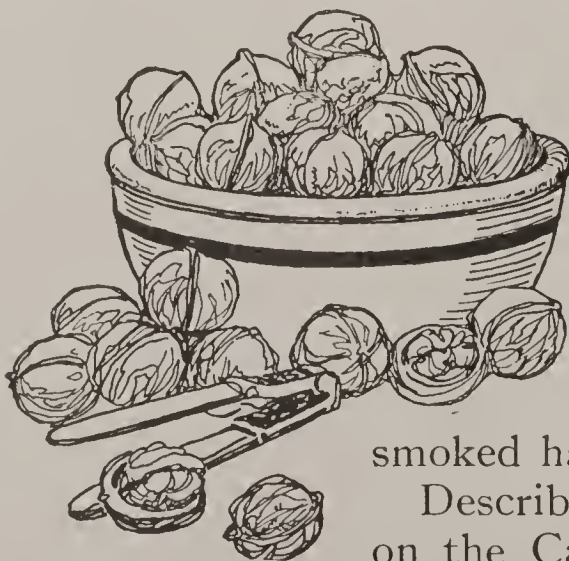
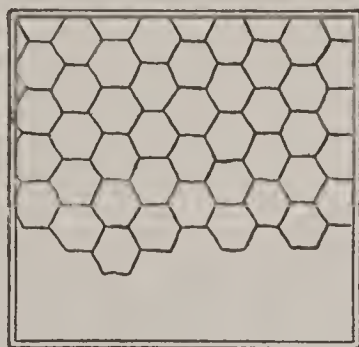
And the almonds and the filberts? 101.

What state and what country supply the olives? 101.

What state furnishes the cranberries for the Thanksgiving and Christmas dinners? 101.

How do the bees gather material for their honey? 399.

What is said about their "market baskets"? 399.



What do the bees put up so much honey for? 401.

Which of the three classes in the bee community do the manufacturing of the honey? 394.

Why don't the bees make honey in the winter time? 395.

How do the bees make the wax for their little

honey warehouses? 395.

How does the honey the bees make help them to make cells to hold more honey? 395.

How do the bees "pack up" when they are getting ready to move? 395.

How do the bees get their warehouse ready for the honey? 395-398.

How do they build their honey warehouses? 398.

How does modern machinery save labor for the bees in building their honey warehouses? 398.

What winter foods are grown in the Middle Atlantic States? 50.

In what part of the Mississippi Valley are rice and sugar grown? 108.

Where is the corn belt? 108.

From what you can see in the picture and the information beneath it, tell how the whalebacks bring the grain from the fields to the mills? 108.

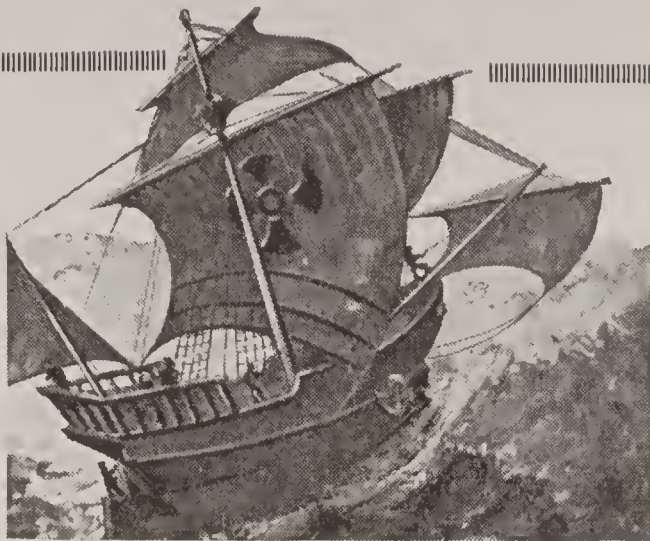
What does Uncle Sam have to do with smoked hams? 111.

Describe the big grain elevator on the Canadian Northern. 220.

Discovering

America

How Did
Columbus Do It?



How Can
You Do It?

How does it come that you know so much more about America than Columbus did? 7.

How did he happen to discover it when he wasn't looking for it? 7.

How long did it take Columbus to cross the ocean and find "us"? 7.

What did the little bird tell him; why did he infer that he was near land when he couldn't see any land? 7.

What two events changed the history of the world the most? 1433.

What is said about the variety of motives that produced such a zeal for discovery after Columbus found America? 1434.

What is meant by the "Age of Discovery"? 1434.

Why were the Norsemen such daring rovers of the sea? 1434.

How does it come that the pilots of the Norseboats wore feathers? 1438.

How did the Norse inspire Columbus? 1438.

Why was it that Columbus, although a native of Italy, sought service in a foreign land? 1439.

What did the Chinese have to do with the discovery of America by Columbus? 1439.

What did Marco Polo, whose stories of adventure you probably have read, have to do with this excitement about exploring the world? 1440.



What was the Renaissance?

1440.

To what country did Columbus go to seek employment? 1441.

How does it come that Portugal, which is a small country now, was so important in those days? 1441.

Why did Columbus fail to get a hearing in Portugal at first? 1443.

How many famous explorers, sailing westward, were on the water at

the same time with Columbus? 1443.

How did the English come into collision with the Spanish in connection with the exploration of the new world? 1445.

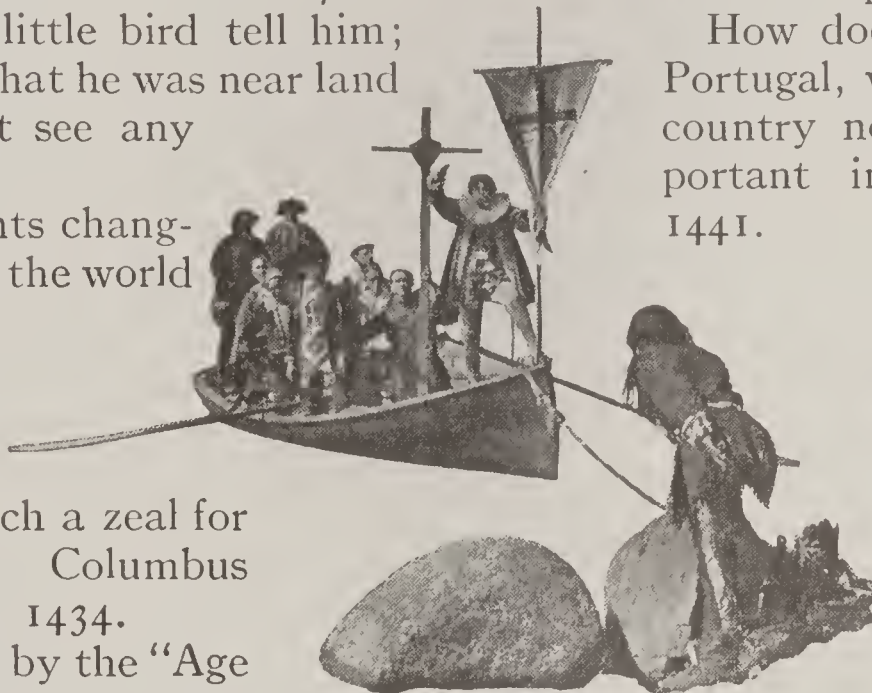
In what way did the English fight the Span-

ish? 1445.

What was the beginning of England's sea power? 1446.

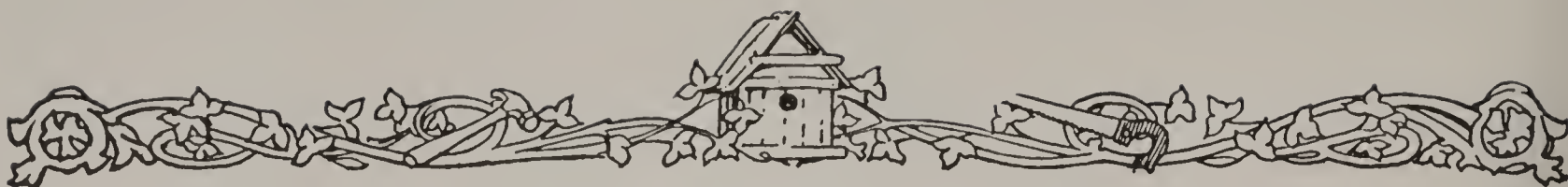
Who was Francis Drake? 1446.

How did the Dutch get into the struggle for new lands? 1448-9.



COLUMBUS ROUTE





Manual Training and Mechanical Drawing

Remembering that Edison's ideas for his wonderful inventions are planned on paper before they are put into working form, and how his head and his hands help each other, you will appreciate all the more the pleasure and profit of manual training in school work and the practical value of mechanical drawing.

If somebody should say to you, "What's the good of manual training?" how many of its benefits could you mention? 802.

Is it of much value to the boy who doesn't intend to become a skilled mechanic or an inventor, or anything like that? 802.

Does it require much of an equipment to get good results from manual training? 802.

What tools do you need to start with? 802.

Do you know how to take the blade from the carpenter's plane, sharpen it and put it back again? 803-808.

What are blue prints? 808.

Can you put into words the directions for building a bird house such as is given in the portion of the working drawing here reproduced? 716 and 809.

What do the dotted lines mean? 716.

What do the unbroken lines mean? 716.

What is meant by 9" and 10"? 716.

What is the T-shaped drawing instrument immediately below the bird house? 716.

Describe how a T-square is used, drawing a

picture to show what you mean. 716.

Is it necessary to be particularly careful in mechanical drawing? Why? 717.

What are compasses used for in mechanical drawing? 717.

Can you make a working drawing of a cone? 715.

Now can you make a cone of paper? 715.

What is the first thing you need when you set up your workshop? 802.

What tools will you need to get? 803.

What caution is to be observed in the use of the rip-saw? 810.

How do you set a plane blade? 806.

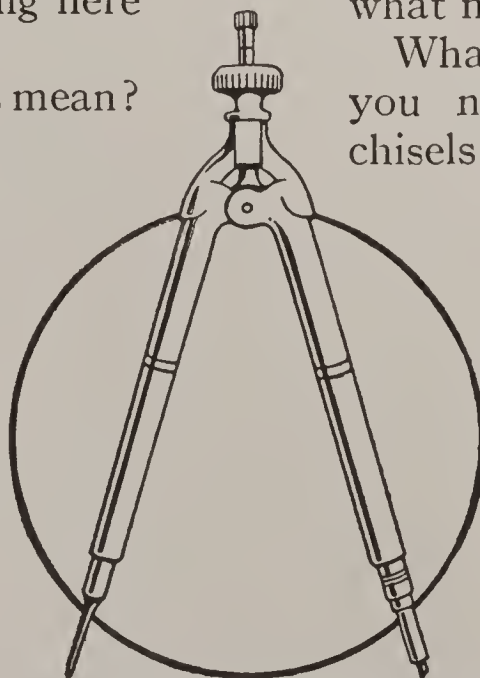
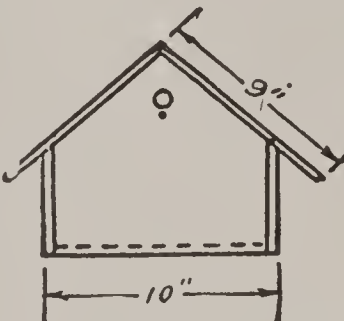
Can you start using your saws and jack planes as soon as they come out of the store; if not, what must you do first? 806.

What kind of a whetstone do you need for sharpening your chisels and plane blades? 808.

Is it desirable to have more than one kind of stone; if so, why? 808.

What about your supply of lumber at the beginning of your work? 808.

How do you start a cross-cut saw into a board? 809.



Educating the Head to Look After the Body

The care of the body is so important that October 7th, "Health Day," has been specially set apart in the schools to deal with this subject.

Are the little people who do the work in our bodies jack-of-all-trades, or does each one tend to a special line of work? 246.

What kind of diet do they live on? 246.

What is said about the mill and the King's taster? 247.

What is the first thing done to food when it comes to the community mill? 248.

What are the tubes for in the mill? 248

How does the liquid that comes through the tubes affect the food which is being ground? 248.

Why does the grist keep getting finer and finer as it approaches the back door of the mill? 248.

Why is the grist constantly turned over and over? 248.

Why should we keep these mill stones clear? 257.

Now going down into the community kitchen, what

happens to eggs, nuts, meat, and things like that? 249.

What happens in the second factory? 249.

How is the food, after it leaves the kitchen distributed to the various parts of the community? 249.

How does the liquid food get to the pump? 249.

Where does this little pump get its power and how is it

repaired? 249.

Who governs this pump? 249 and 260.

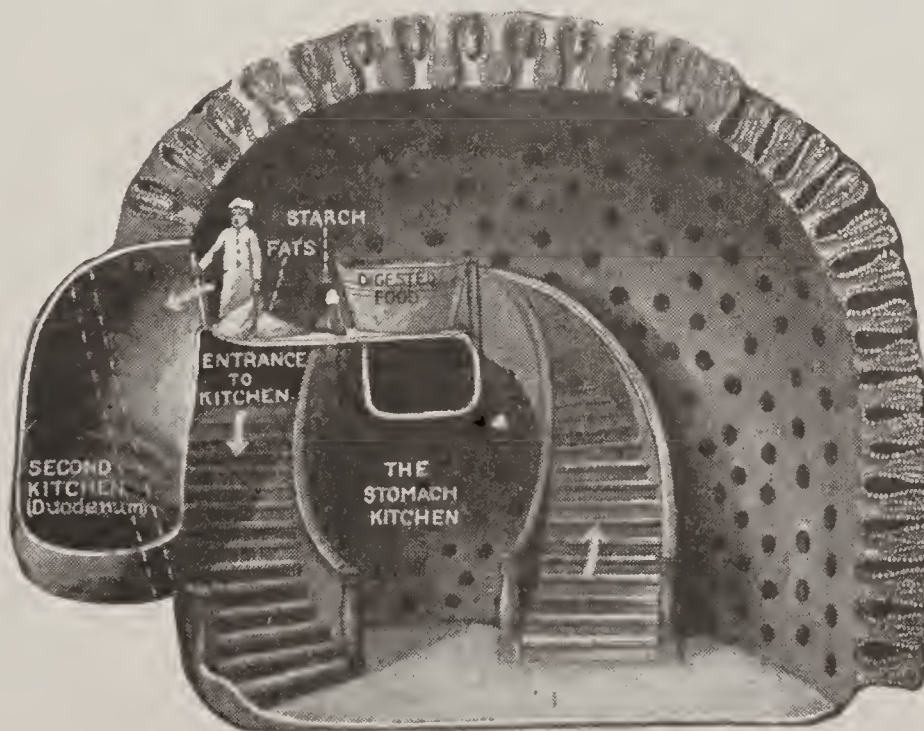
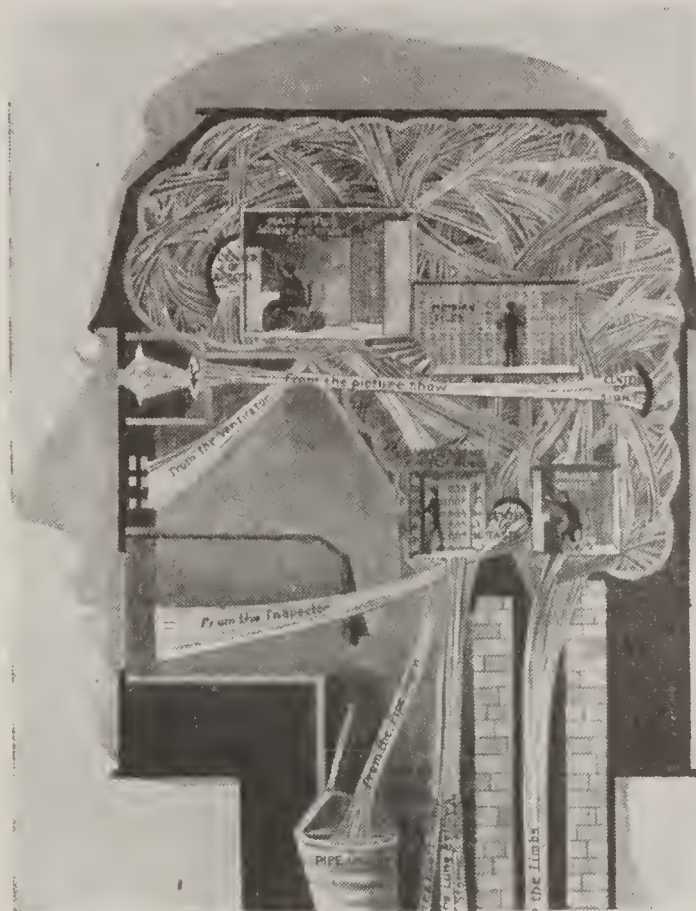
Why do we need fresh air? 250 and 257.

How is the air tested when the community moves into new localities? 250

When is dusting day in this community and why? 250-251.

Take a trip through the capitol building of this community and tell us what you see. 252.

What is the interpretation bureau? 253.



Seed Selection and Corn Harvest

Look at the picture of the three ears of corn, pick out the one you think is best and then see if you are right. 510.

Who has taught us the use of corn? 511.

What proportion of the world's product of corn does the United States grow? 511.

In what part of the United States is corn grown? 511.

Why did Uncle Sam take special pains to teach the boys about increasing the corn crop? 512.

How many boys enrolled in the first contest? 512.

How large were the corn ears required to be before they could enter the contest? 513.

What are the two great things to be looked out for in raising corn? 513.

What did Uncle Sam's experts tell the boys about caring for the corn after it was in the ground? 514.

How did the work done by the boys compare with the work of their fathers? 514.

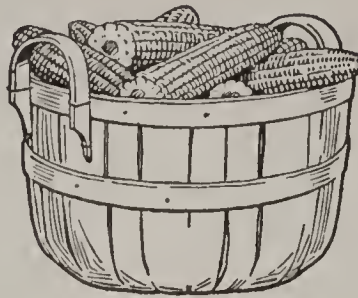
What time of the year is the seed selected in the field? 514.

What are the different parts of a corn plant used for on a well regulated farm? 515.

Tell how corn is handled in the great modern mills. 516.

How is corn syrup made? 517.

From what part of the ear do you take the grains in selecting the seed? 521.



What do you look for in selecting the seeds? 521.

How do you get rid of the moisture in the sawdust that you do not want? 521.

How do you prepare the germination boxes? 522.

How do you place the kernels in the box? 522.

Why are the grains covered with cloth and how do you do this? 523.

How do the corn grains show that they know geography? 523.

How long does it take them to germinate? 523.

Can you tell the fortunes of the corn seeds in the twelve compartments of the picture? 525.

What is the rag baby test for seed corn? 526.

Where is the most corn raised in North America, outside of the United States? 511.

Why don't the newspapers usually have as much to say about the corn crop as about the wheat crop? 511.

What effect does a short corn crop have on the price of beef, pork, milk butter, cheese, poultry, and eggs? 512.

When should seed corn be gathered? 512.

How long should an ear of corn be before you should think of using it for seed corn? 513.

How is corn raising studied in the schoolroom? When may you be said to have half your work done in raising corn? 513.

What is the best kind of land for corn? 513.



Fire Day and Fire Heroes

(Fire Day—October 9th)

Many lives and millions of dollars worth of property are destroyed from fire because the fires originate through carelessness. The schools accordingly have a special day for discussing the subject of how fires are started and how to avoid them. The date chosen is that of the great Chicago fire—October 9th.

What do you learn from the picture on this page? 906.

Why were the Indians so careful about fires? 907.

In what way were the lumbermen often responsible for forest fires? 909.

How did the campers help to start fires? 910.

And the hunters? 910.

What has been the loss of life from forest fires in the last hundred years? 910.

What has the destruction of timber amounted to? 910.

In what way did the Chicago fire occur? 911.

How did the loss of the trees help to bring on floods? 912.

In what way are railroads now helping to prevent forest fires? 915.

What happens to people who are guilty of carelessness about fires in our National Forests? 915.

How do the farmers, stockmen, railroad hands and others



work together in preventing forest fires? 915.

Isn't that a wonderful story of the New York fire captain who saved the hotel guests? Can you tell the

story for us? 960.

What are some of the other brave and skillful things that firemen are constantly doing? 960.

What are the fire chiefs and captains doing while the men are risking their lives? 960.

What are the hours of firemen? 960.

What does the fire chief do when he isn't going to fires? 960.

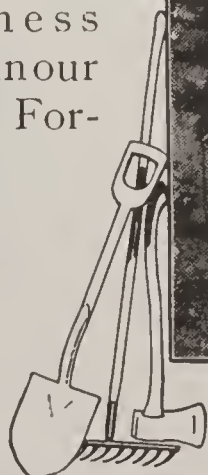
How do many cities provide for the families of firemen killed on duty? 965.

Why did the little boy speak of his father, the fireman, as a soldier? 965.

How do the firemen carry a heavy man down a ladder? 960.

What quick way have the firemen of getting from their sleeping rooms on the second floor down to the first when a fire alarm is sent in? 961.

FOREST
FIRES.
WARNING



The Night of

What are those two little girls at the bottom of the page "up to" do you suppose? It looks very much to me as if they were trying to frighten somebody. Why of course, it's Halloween!

How do children recall the fun of Halloween night in their physical exercises? Can you go through with these exercises? 996.

What famous poet has written a poem describing the pranks of Halloween? 996.

Why is Halloween connected with the idea of witches, "spooks" and weird faces? 996.

Why did the people in the old superstitious days try to keep awake until after midnight? 996.

What was supposed to be the peculiarity of dreams on Halloween night? 997.

How did young people try to find their future wives or husbands by the use of nuts? 997.

And what about looking glasses and cabbage stalks? 997.

What is the idea of walking down stairs backward with a mirror and a candle? Don't you think one would be more apt to see stars than anything else? 997.

What do the queer masks worn on Halloween stand for? 997.

Did you ever try apple bobbing with the lighted candle attachment and how is it done? 997.



Strange Faces

Another variation of the apple stunt is to hang the apple up by a string and have two or more players try to catch it and take a bite without the use of their hands. It isn't easy.

Another game is to hang a barrel hoop from the ceiling on

which are strung at intervals, cakes, apples, nuts and candy.

What is the difference in the way Halloween is celebrated now-a-days and in former years. 997.

How does it compare with the "Safety First" celebration of Fourth of July? 993.

What was the charm the witches recited in Macbeth? 998.

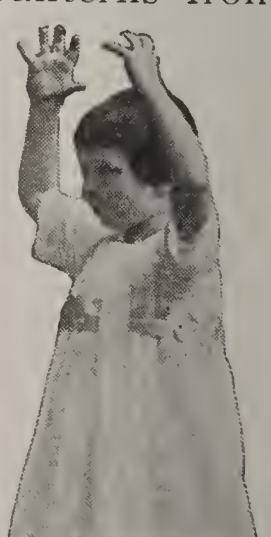
How are apple parings used to discover one's "fate"? (The shape of the parings are supposed to show the initials of the future husband or wife.)

998.

A Halloween party is made especially attractive by appropriate decorations in the rooms in which it is given. Apples, pumpkins, autumn leaves and stalks of grain can be used to great advantage.

And did you know that with a little pains, you can make lanterns from

funny - shaped squashes, turnips cucumbers, apples, as well as pumpkins? It only needs a little skill and a pocket knife.



QUESTION

OUTLINES

FOR NOVEMBER

The Night Skies

Do you think, if no one had ever told you, that the group of stars called "The Little Bear" would have suggested a bear to you? 300.

What is the difference between these groups and the planets, as to their coming and going? 299.

How can you find the "Big Bear"? Why is this group also called "The Dipper"? 300.

Where is the Big Bear with reference to the Little Bear? 301.

How many of these star groups are there? 300.

How did they get their names? 300.

From what were the planets named? 300.

What is the brightest star in the sky? 300.

How large is it compared with the earth? 300. Where would you look for it in mid-winter? 300.

The little boy in one of our pictures is measuring the moon. Can you tell us just how he does it? 297.

Do you think you would like to live in the moon; why not? 295.

If you took a walk on the moon, tell something about the scenery you would find. 295.

What is it that makes the moon's face? 295.

Why are shiny shoes like the moon? 296.

How does the earth "lead" the moon? 296.

Why does the moon pull back from the earth but cannot break away? 296.

Why is it that one time of the month we cannot see the moon, even though we may be looking at the very place where it is? 296.

What is it that makes the phases of the moon? 296.

What is the sun made of? 296. How do they know which way the sun whirls? 296.

Why is it proper in a playful sense, to refer to the sun as our "grandfather"? 298.

Why is the sun like the ring-master in an eight-ring circus? 298.



The Puritans and the First Thanksgiving

Tell about the time when the Puritans lived in their ship. Why didn't they live in houses? 1483.

Why did the Puritans choose this place to anchor, and what did it have to do with their food supply? 1483.

Were all the English colonists Puritans? 1484.

Name two presidents and a famous statesman who came of Puritan stock. 1484.

How does it come that some of the Puritans had Dutch and Belgian wives to cook the family Thanksgiving dinner? 1485.

How did the Puritans show their strength of character? 1485.

Who was Rose Standish? And what is the truth about Longfellow's pretty romance, "The Courtship of Miles Standish"? 1485.

How many residents had Virginia when Plymouth was settled in 1620? 1486.

Describe the chest in which the Standishes kept the garments which they wore on Thanksgiving Day and other special occasions. 1486.



How did the ideas of the Puritans, with regard to the New Land, differ from those of the Spanish and French? 1486.

In what way did their religious convictions

determine the action of other colonists in coming to America? 1487.

Tell about the pewter spoons used in Colonial days and how these spoons were made. 1487.

Why did people go to the woods to get new spoons in Colonial days? 1487.

Can you tell the story of "The Sugar Bowl, the Tea Party, and the Prince Who Didn't Know What to Do"? 1488.

How long did the religious wars of Europe last? 1488.

What was the effect of the religious intolerance practiced in England? 1488.

Where was the only safe refuge for people who held beliefs different from that of the established religion in Europe? 1489.

What was the difference between the "Mayflower" Puritans and the Puritans of Boston and Salem? 1489-1490.

Tell about the dippers that grew in the garden. 1489.

And about the colonists and their spice mills. 1489.

Was it as easy to get spice for Thanksgiving foods in Puritan days as it is now? 1489.

Where did mother get the flour for bread and cakes on Thanksgiving Day in the times of the people of the Colonies? 1491.



Saving Life on November Seas

November is the beginning of the stormy months of the year; and when the brave and skilful life-savers of the beach patrol have most work to do.

How are the life-savers kept constantly in training? 1856.

How are they taught to handle the lifeboat? 1856.

Wouldn't you think anybody could swim in a cork jacket? But is it true? 1856.

And would you think they would need practice in building a bonfire on the beach? 1856.

What other things, beside those mentioned, must the members of the beach patrol learn? 1856.

Is there any time of day when some of the life-savers are not on duty? 1856.

How many hours are the men on duty at a time? 1856.

How would you like to take a walk with one of them some bad night; what would it be like? 1856.

What does the first man do who sees a vessel in distress? 1856.

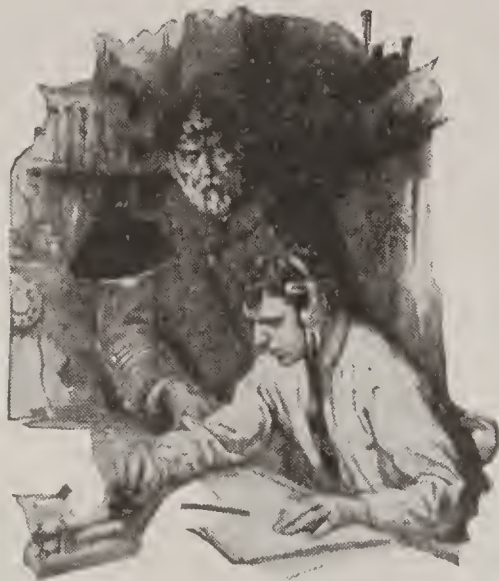
What kind of a "wireless" telegraph system of their own have these men of the beach patrol? 1856.

How does a vessel in distress call for help? 1856.

Describe how the men start to the rescue of a ship in distress. 1856.

What do they carry in the beach wagon? 1856.

What is the first thing they do when they get to the shore opposite the



ship, if the sea is high? 1860.

Nothing that man has ever done has contributed so much to the saving of life at sea as the wireless telegraph, by which a vessel in distress can call for help across the waters. Tell how the ships of various nations came to the rescue when fire broke out on

the Volturno. 310.

How did telegraphing by wires lead to telegraphing without wires? 2198.

Why is the traveling of electric waves compared with the traveling of light waves? 2198.

When did the British post office first begin the experiment of sending messages without wires, and how far were these messages sent? 2198.

Who perfected the wireless instrument now in use? 2198.

How far can wireless messages be sent now? 2198.

How is a message sent out? 2198.

Do these messages go straight

ahead like the message over a telegraph wire? 2201.

What does the instrument look like that receives wireless messages? 2201.

What is one drawback about sending messages by wireless? 2201.

Can messages be sent by wireless as rapidly as over wires? 2201.



The Wonderful Reaper and Its Inventor

How was wheat harvested by primitive man? 684.

How was the stone sickle used? 684.

Who invented the cradle for harvesting, and how long was it used in this country? 684.

How long does it take to produce a bushel of wheat by modern labor-saving devices? 685.

How did they "tread out the corn" in Egypt? 1572.

What is meant by the word "corn" in the Bible? 1572.

Why do these oxen wear blinders, but no muzzles? 1572.

What are the blinders for? 1572.

Why do they have those palm

branches hanging from the blinders? 1572.

How many of the references to harvesting in the Bible have you looked up, and what did you find? 1572.

What advantages, besides poverty and eight brothers and sisters, did Cyrus McCormick have? 1586.

In what way did his father help him? 1586.

And how did they get along together? 1586.

What was the first reaper on which Cyrus tried his hand? 1586.



How long did it take him to make his first reaper? 1586.

What did he do to get iron? 1588.

What did the people do when he first asked them to invest money in his invention? 1588.

Who was the first man who helped him? 1588.

And what big city was this man connected with? How was he connected with it? 1588.

What did the invention of the reaper have to do with winning the war for the Union? 1588.

How did the reaper extend the use, and increase the value, of land? 1588.

Describe to your father or mother, or

some of your brothers and sisters, so that you can afterwards do it well in school, the workings of the "harvest hand with iron fingers," pointing to



the parts of the picture as you describe it. 1589. (And don't you think you could make a pretty good picture of it on the blackboard?)

How did the old stone, shown beneath the picture of Mr. McCormick, help to increase the world's supply of bread? 1589.

Tell the story of the birthplace of the reaper. 1590.

The Sugar Industry

Why is it so much easier to empty the sugar bowl than it is to fill it? 527.

What is there about the story of sugar that reminds you of the mouse that lost her tail? 527.

What kind of raw candy do the pickaninnies eat? 527.

Where does the sugar cane grow in the United States? 528.

What kind of soil is best for sugar cane? 528.

What is the difference between the method of planting sugar cane and the planting of corn, the stalks of which the sugar cane so much resembles? 528-529.

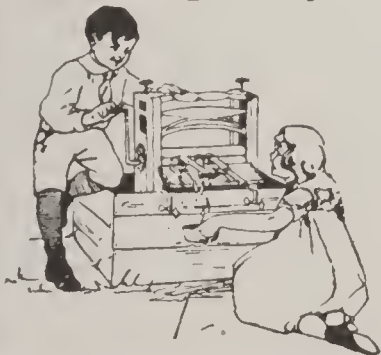
What other things that give us food are planted in somewhat the same way? 529.

How fast does the sugar cane grow? 529.

Why doesn't it pay to grow sugar cane on small farms? 529.

Imagine that you have been visiting a sugar plantation and describe what the field looks like; and the big white house, and the negro cabins, and everything. 529.

Shade on an outline map of the world the sugar-producing regions. (If you haven't such a map you can easily copy the one in Pictured Knowledge.) 528.



To what great city do the river steamers of Louisiana carry the raw sugar? 530.

What are the little people do-



ing in the two lower corners of this page? What has it to do with sugar-making? 530.

What does the machine look like that "chews" the

cane. (Look at the picture and then describe it in your own words.) 530.

Now compare your description with that in the text. 530.

Why do they have railroads on large sugar plantations? 530.

What kind of little birds are interested in the sugar-making season? 530.

How are the canes from which the juice has been squeezed, used to squeeze out juice from other canes? (Just see if you can think of an answer before looking at the page.) 531.

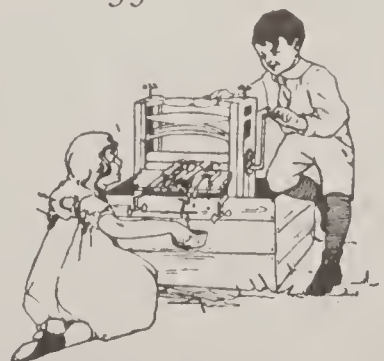
What do they do with the ashes of the cane burned under the boilers? 531.

Do you think, judging from its looks, you would want to drink sugar-cane juice if you didn't know what it was? 531.

Do you think you would like it anyhow? 531.

What kind of milk is used for clearing the sugar juice; and what else does this "milk" do to it? 531.

How is sugar madewhite? And why might a mil-liner be able to quickly give the answer to this question? 531.



About the Little Brown Friends that Come to Breakfast

What was the editor's idea, do you suppose, in reproducing a picture of the minaret in Gérôme's "Call to Prayer" in the story of coffee? 557.

What does the map show back of the two little Arabs with the big coffee cup? 557.

What is that procession of people doing on the right? 557.

Where did coffee get its name? 558.

How was coffee "served" at first? 558.

See if you can find out to what country those people in the picture belong, "How Moccha gets to market," by using the maps and pictures in your geography (supplemented, if necessary, by a reference to an encyclopedia). Then look at the account of how a little girl and her mamma worked out this picture puzzle and see if you have the right answer. 558-559.

How did Mr. Kaffa Bunn get to the Americas? 559.

Why might the Dutch captain have located his little coffee grove, while still three miles out at sea, with the help of his nose? 559.

How much of the year does the coffee plant stay green? 559.



What two things about the coffee blossom remind you of a tuberose? 559.

Why is it that, while the flowers of a coffee tree fall in five or six days, the tree is in bloom for four or five months? 560.

What is the color of the coffee berries at first; then what; then what? 560.

To what section of the Americas did the descendants of Mr. Kaffa Bunn spread after their first location in Dutch Guiana? 560.

What kind of soil does the coffee tree like best? 560.

Where are the largest coffee fields in the world? 561.



Why do you find the names "Santos" and "Rio" on coffee bins at your grocer's? 561.

The coffee regions of Brazil are right on the sizzling Tropic of Capricorn, and yet the climate is very pleasant; why is this? 561.

Why are the roads in the coffee region so red? 561.

Why is the coffee plant sometimes called a coffee tree and sometimes a coffee bush? 562.

How long will a coffee tree live if properly cared for, and how many crops does it produce in a season? 563.



Going to School to the Cook

Mother's kitchen is the most delightful school in the world for girls, and if you have a good-natured cook (as, of course, all nice girls have), she is a good teacher too; and in November, the Thanksgiving month, there are so many things to learn. Now let's see what we can learn from the Pictured Knowledge cook to help out.

First of all, what is food for?
779.

And what is protein? (You hear a lot about protein in the scientific study of cooking so you might as well learn what it is.)
779.

Why wouldn't we need protein if we could eat the air we breathe? 780.

What has fat to do with energy?
780.

What is the relation of sugar and starch from a food standpoint, and what are carbohydrates? 780.

Name three kinds of food that contain a great deal of each of the following things that are necessary in food: proteins, fats, carbohydrates, mineral matter, water. 780.

Is the use of water important in connection with food? In what way?
781.

What about the food value of milk?
781.

Do you know how milk should be taken care of? 781-782.

Tell about the food value of eggs. 782.

Why are eggs particularly good food for children? 782.

What is the best way to tell whether an egg is fresh or not? 782.

Is meat absolutely necessary in our diet? 782.

Do you know the geography of beef? Put your hand on the reading matter under that picture of beefsteaks and things "on the hoof" and see if you can tell



what the different letters and numbers stand for. Then compare the figures and the explanations until you are fairly familiar with them and then try it on the cook. 784.

What are the dangers to be avoided in the selection of meat? 784.

What are the cuts of meat shown at the bottom of the page? 785.

Suppose a butcher should try to sell you a sirloin for a porterhouse, could you tell the difference? 785.

How does the chuck rib roast compare in value with the blade rib roast?
786.

How does the fat help you in choosing a good roast? 786.

What are some of the things to look out for when you are buying dressed chicken? 786.

How should cracked wheat be cooked? 786.

Is there any "trick" about putting dry cereals in the boiling water; if so, how should it be done? 787.

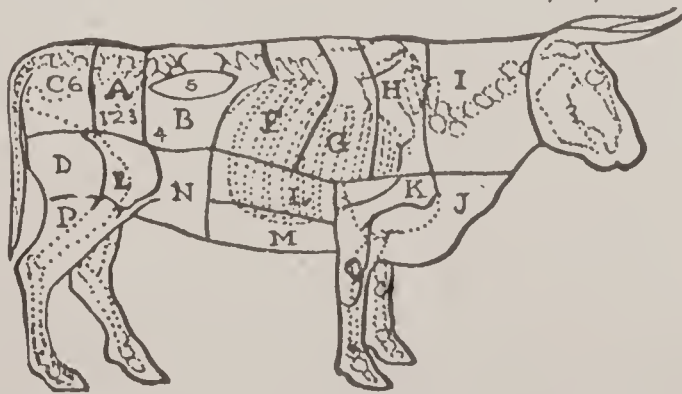
Would you throw away cold cereals? Then what would you do with them? 787.

If you were going to make bread for the Thanksgiving dinner, how would you go about it?
787.

What kind of flour would you

choose? 787.

What should the crumb of the bread look like, and how should it act between the fingers? 787.



Sheltering Walls and November Winds

What building is that skyscraper at the bottom of the page? 55.

Why is a skyscraper said to be a steel bridge set on end? 1933.

Compare the sky-line of New York City with that of the Olympia of the Greeks; what is the most striking difference? 1929 and 1934.

Where did men find their earliest shelters? 1922.

Who were the Mound Builders and what did they do? 1922.

In what way does the development of architecture compare with the development of invention? 1922.

What can you tell about the underground temples of India? 1924.

Who were the lake dwellers? 1924.

Take a good look around in the picture and then tell how London probably looked in the days of the ancient Britons. 1926.

What was the first great step in changing a hut into a house? 1929.

What are the most striking distinctions between the Greek and the Gothic styles of architecture? 1932.

In what class of buildings do we use the Greek style of architecture today, and in what the Gothic? 1932.

Tell about the different kinds of front porches. 1932.

In what style of architecture is the White House built? 1933.

In what way is the Eskimo's humble hut to be compared to the stately cathedral of St. Peter's and St. Paul's? 1934.

What did Ruskin say about buildings that do and buildings that tell? Can you illustrate his meaning by some examples? 1934.

What different kinds of architecture are combined in the picture at the top of the page? 1936.

Suppose you try to build a mediæval castle as the children did in Franklin, Indiana. How would you do it? 1937.

How did the temples originate in the respect and affection shown to the dead? 1939.

Tell about the architecture of the Egyptians. 1940.

How did it express their ideas about the character of their gods? 1941.

How did the Greeks come in contact with the Egyptians, and what did they do with the knowledge they got from them? 1941.

In what way did the Parthenon express the character of Athena as the Greeks conceived it? 1943.

Are the pillars of the Parthenon straight, as they seem to be? 1943.

How about the floor; is it level? 1943.

When you compare the Parthenon with the temple of Karnak, what is the fundamental difference in the impression you get? 1943.

How did Roman architecture compare with the Greek? 1944.

What great feature of architecture do we owe to the Romans? 1945.



QUESTION

OUTLINES

FOR DECEMBER

Traveling at Christmas Time

The trains are always loaded at Christmas time with people who are going home to spend the greatest of the annual holidays with the rest of the family. Wouldn't it be interesting to learn the wonderful story of the development of means of travel, both by land and sea, which makes these journeys possible? Christmas travellers come from all parts of this great country, and some go to Europe, the old home of many of our fellow citizens.

How long since the very first railroad was built? 1066.

What was man's first means of transportation? 1066.

How do we know that the Greeks, and before them the Egyptians, had horses to carry them about? 1066.

How do we know that the use of horses is as old as the myth of Apollo? 1066.

What do we owe to the camel in the development of travel by land? 1067.

What is the little camel of the Andes? 1067.

Tell about the services of the elephant. 1067.

And the donkey. 1067.

Tell about the "horses" that Santa Claus drives. 1067.

And the wild "horses" of the Eskimos. 1068.

Why is it that it makes you feel so "funny" when you ride on a camel? 1070.

Tell about the knights and their horses. 1071.

How do you think you would have enjoyed a ride in a Roman chariot? 1073-1074.



Home for Christmas

When did coaches first come into use? 1074.

Tell about the first stage-coach lines in this country. 1074.

And the first railroads. 1078.

What was the origin of boats? 1087.

What did men first use for paddles? 1088.

In what way did the Indian's way of building his birch-bark canoe compare with the building of trans-

Atlantic liners today? 1090-1091.

Tell about the boats of the Ancients. 1092-1093.

How did King Alfred learn ship-building from the pirates? 1094.

Tell about the boy who put the steam into the steamboats. 1099.

How do big ships push themselves through the water? 1106.

Describe the things you see in the theatre-room on the big ocean liner. 1107.

And in the restaurant. 1107.

Can you go swimming while you are taking a trip in an ocean liner? What does the "swimming hole" look like? 1109.



Our Uncle Sam Santa Claus

You remember the story about the magical rug in the Arabian Nights don't you? What is it, that isn't as big as one of the figures on a rug, that does more wonderful things than that rug? 951.

What is the first thing that happens to the stamps on Christmas letters and Christmas packages? 951.

How do they drop things in the mail box in big office buildings? 951.

How are Christmas letters and packages carried underground? 951.

How is it that a mail train is able to pick up mail at a station without stopping? 951.

What are the "post offices on wheels"? 951.

What is meant by "throwing the mail"? 951.

How would your knowledge of geography and skill in the use of maps come in handy if you were a mail clerk on one of these post offices on wheels? 951.

Are the letters sorted more than once before they reach their destination? 952.

How is the mail first distributed when it reaches a city? 952.

Then how is it further distributed in the different districts? 952.

In what way is the delivery of mail by underground tubes like the working of a boy's pea shooter? 952.

What are some of the different

ways in which letters ride? 952.

What do you do when you want a letter to be delivered in a hurry? 952.

What happens to letters that are not properly addressed, where there is no return address on the corner? 952.

Where is the dead-letter office? 952.

What do they do with a letter when they can't make out the address of the person for whom it is intended, and the writer's address is not given on the outside? 952.

Tell about how letters get across the ocean? What is a post office boat? 954.

How does the post office boat get mail from the big ocean steamers? 954.

What is the limit in size of things you can send by parcels post? 955.

Tell about some of the queer things that are sent by parcels post. 955.

How do they get mail from the New York post office directly into the railroad cars? 956.

Look at the pile of Christmas letters and packages on the table and then make up a story about where some of these packages came from and which of the members of your family are going to get them. 956.



How the Christmas Chocolate Drops



Of course we eat chocolate drops—whenever we can get them—at all seasons of the year, but they are especially attractive at Christmas because they are apt to come in great big boxes. So it will be particularly interesting here to learn all about the story of the chocolate drop.

Why might growing cocoa pods be mistaken for cucumbers on a tree? 1325.

Illustrate how many different countries may have helped to make the cup of cocoa you drank for lunch. 1325.

In what kind of climates does cocoa grow? 1325.

What is the first step in the making of a chocolate drop? 1325.

Why are the heaps of cocoa pods compared to mother's old-fashioned crazy quilt? 1325.

How are the pods opened? 1325.

Who takes out the seeds? 1326.

What is the first thing that is done with the seeds? 1326.

What is meant by "dancing the cocoa"? 1326.

Why do they have the roofs of the drying-sheds on wheels? 1326.

What country makes the most chocolate? 1325.

What are some of the queer things they find among the cocoa beans when they reach the factory? 1327.

After the beans have been cleaned, what is the next thing that is done to them? 1327.

After they have been roasted what is done with them? 1327.

How do the beans go to mill? 1327-1328.

Why is it that the cocoa beans, when ground up, come out in the shape of an oily fluid? 1328.

How near does this come to being chocolate icing for cake? 1328.

What is necessary to add to this chocolate after it is first ground to make it taste good? 1329.

How is milk chocolate made? 1329.

How are chocolate creams made? 1329.

How do the creams get their different colors? 1330.

How do they make the powder for breakfast cocoa? 1330.

Is all chocolate alike? 1331.

Why is chocolate supplied to soldiers on active duty? 1331.



The Work of the Needle at Christmas



No gifts are more delightful to giver or receiver than those which we make ourselves. A boy who has had the benefit of Manual Training can be a wonderful Santa Claus, and so can girls who know how to make things with the help of needle and thread.

Do you know how to make a running stitch? 733.

How do you gather? 734.

What is back stitching? 734.

In making an overhand stitch, what do you do with your left hand and what do you do with your right? 734.

What is the difference between overhanding and overcasting? 735.

When you are hemming, how do you measure the hem and keep it even? 735.

On what kind of material do you use the rolled hem? 735.

How do you make a French seam? 735.

How do you do felling? 736.

Now about the buttonholes; what is the first thing you do? And how does the button itself help in making a buttonhole? 736.

How do you make the buttonhole strong? 736.

Do you think it is so very easy to sew on a button so that it will look neat and won't come off? How do you do it? 737.

Tell how you sew on hooks and eyes. 737.

All this about sewing in general; sewing that will apply to dresses for little sister or to a new shirtwaist for mother. Now about dressing that doll for a baby sister; how do you make her middy blouse? 740-741.

How do you make the patch pocket for the blouse? 741.

And the bloomers, how do you make them? 741-742.

What are you going to do for stockings? 742.

Tell how you are going to make the hat to suit the suit? 743.

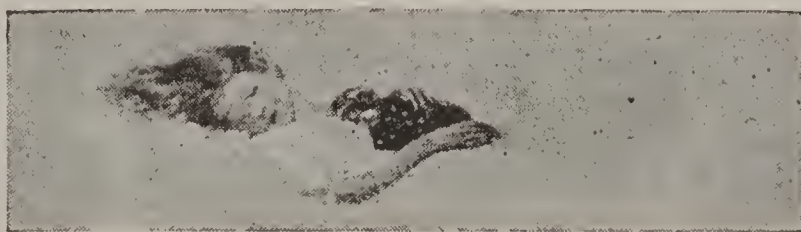
How do you make Dolly's underwear? 743.

Of what will you make her petticoat, and how will you make it? 743.

And she must have a party dress for her birthday. (Little dolls have birthdays just like other little people, you know.) 744.

And when Baby Sister puts her to bed at night she must have pajamas; how do you make them? 744.

And the bedroom slippers? 746.



Two Good Friends—Santa Claus and Good Books

Two of the best friends we have at Christmas are Santa Claus and good books. A good book is one of the very best Christmas gifts in the world because it lasts a lifetime. Did you ever stop to think how long it has taken to make a book—just the mechanical parts of it, the leaves and the binding? It has taken a good many centuries.

What is it that beautiful youth on the right of the picture has spread out before him and what is he doing? 1861.

Who wrote the poem he is reading? 1861.

Did the Greeks have many books? 1861.

What did they have that took the place of books? 1861.

What were the scrolls made of? 1861.

From what country did they come? 1861.

In reading from a scroll, what corresponded to the turning of the leaves in a modern book? 1861.

How did the Greeks compare with other people in works of art, literature, and so on? 1861.

What is meant by saying they were a "pictured knowledge" people? 1861.

Name some of the ways in which they created beautiful forms? 1861.

How did they "talk in pictures"? 1861.

Did *you* ever notice how a cow walks? Don't you think any child might call



her a "foot-dragger"? (Think how this word compares with a baby's name for a dog—"bow-wow.") You see one word is a picture of form and motion, the other a picture of sound.) 1861.

Why did Greek children learn their language very readily? 1861.

In what other way did picture words help them beside aiding their memories? 1861.

Why is it that we can dream a very long story in a very few moments; and what has this to do with Pictured Knowledge? 1862.

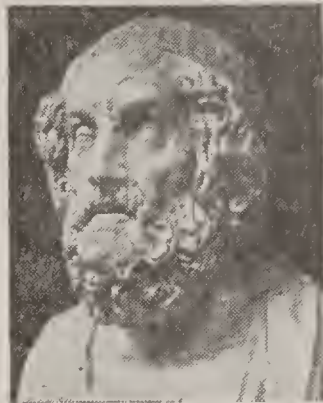
In what way were the Greeks "like us children"? 1862.

Did anybody but the children ask riddles? 1862.

What was the riddle of the reed? 1862.

How many little pictures can you find in this riddle? (There are pictures of apples, and figs, and thin lips, for example.) 1862.

You see they were always—these Greeks—wondering about things. It seemed wonderful to them that spoken words should pass from one brain into another.





The Home

Children's Library

Why is it important that the books for children should be carefully selected? 1143.

Are the best books expensive? 1143.

How do people find what books are to be had? 1143.

What is said of the merit of the supplementary readers used in school? 1143.

What kind of books appeal especially to younger children? 1144.

At what age are children particularly attracted by the fables of Aesop and other fable writers? 1144.

What artist's illustrations of Aesop's fables are especially mentioned in our article? 1144.

What is said about the importance of pictures in children's books? 1144.

Which of the artists mentioned have you noticed as having made the pictures in the books that you own? 1145.

How do such pictures compare with those in the newspaper Sunday supplements? 1145.

What is said about the use of linen books for little children? 1145-1146.

What have the books you use in school to do with the

kind of books you should have at home? 1146.

Have you read Kipling's "Just So" stories? And what others of those mentioned? 1146.

What fairy tales should a child know before the age of ten? 1146.

Name a good book for boys that will help them do things. 1147.

And for girls. 1147.

What stories by writers of standing will interest boys who want blood-and-thunder tales? 1147.

What is said about the out-of-door books of Thompson Seton and others? 1147.

What wholesome modern stories are mentioned in this connection? 1147.

What is said about learning to use the dictionary and encyclopedia? 1148.

How do the interests of boys and girls in reading differ when they reach the age of ten and twelve? 1148.

Name the lives of some famous men and heroes that will delight a boy at the hero-worship period. 1148.

What are good stories for girls to read at the sentimental period? 1148.

The Months

*January brings the snow,
Makes our feet and fingers glow.*

*February brings the rain,
Thaws the frozen lake again.*

*March brings breezes sharp and chill,
Shakes the dancing daffodil.*

*April brings the primrose sweet,
Scatters daisies at our feet.*

*May brings flocks of pretty lambs,
Sporting round their fleecy dams.*

*June brings tulips, lilies, roses,
Fills the children's hands with posies.*

*Hot July brings thunder-showers,
Apricots and gilly-flowers.*

*August brings the sheaves of corn;
Then the harvest home is borne.*

*Warm September brings the fruit;
Sportsmen then begin to shoot.*

*Brown October brings the pheasant
Then to gather nuts is pleasant.*

*Dull November brings the blast—
Hark! the leaves are whirling fast.*

*Cold December brings the sleet,
Blazing fire, and Christmas treat.*

SARA COLERIDGE

INDEX

IN books as full of information as a Christmas pudding is full of plums, a good index is essential. The Outline in Volume I gives a bird's-eye view of the entire plan of Pictured Knowledge and presents the school studies dealt with in logical order and relation. The Plan Book adapts these subjects to the regular school course from day to day. The Finding Index completes the scheme by putting every subject and every phase of every subject where it can be found at once by turning to it in its alphabetical order.

A mere glance at the number of pages it occupies shows the thoroughness with which this part of our work has been done. For example, you want to look up "Exploration Period of American History." You find it under "Exploration;" but you may remember it as "Discovery Period," so you will find it under "Discovery." Or you may think of it in connection with the names of some of the different explorers. All these are indexed also, and again the subject appears under "United States," where will be found a complete list of all articles on United States History.

Each of the longer articles and the more important shorter ones are followed by a summary of their prominent features with the pagings. If you want the same subject as told in the pictures, you find a list of the pictures immediately following the summary. Pictures of special teaching value are also indexed alphabetically.

Poetical selections are indexed alphabetically by author, title of poem, and under "First Lines." Similarly, Works of Art will be found under the artist's name, and by title, but are also all brought together under "Works of Art." Myth Stories are collected under "Myth Stories," but each individual story is also indexed alphabetically.

All maps are collected under "Maps," and are also alphabetically arranged under that heading, according to subject. Under the heading "Plan Book" will be found the pages on which the outline for each month begins.

Finally it will be noted that the wording is not of the usual dry character of an index. It is interesting in itself and appeals to the child's curiosity, thus achieving one of the chief ends of the whole school life—stimulation of the desire to know.

A B C's, why the Greeks did not like to learn them, 1862

Abolition sentiment, growth of, 1617

"About the Fairies" (poem), Anonymous, 1141

Accented outlines in drawing, illustrated, 722

Account books, different kinds of, and how they are kept, 283

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